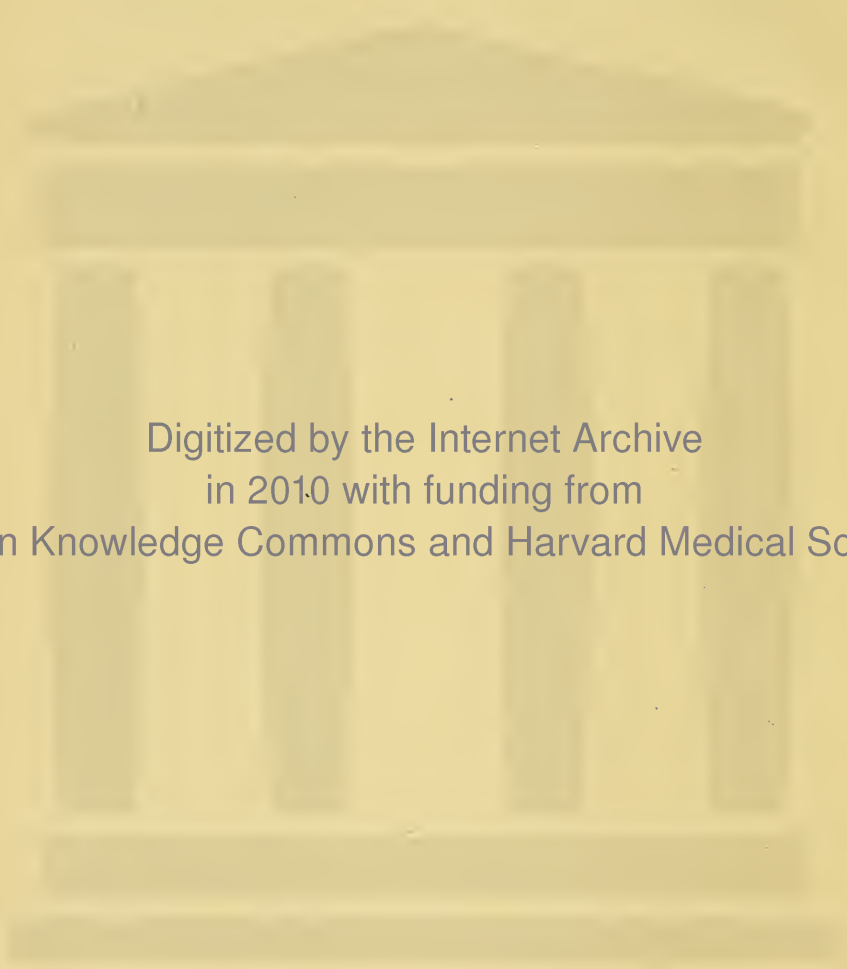


THE
HEALTH RESORTS
—OF—
COLORADO SPRINGS
AND
MANITOU

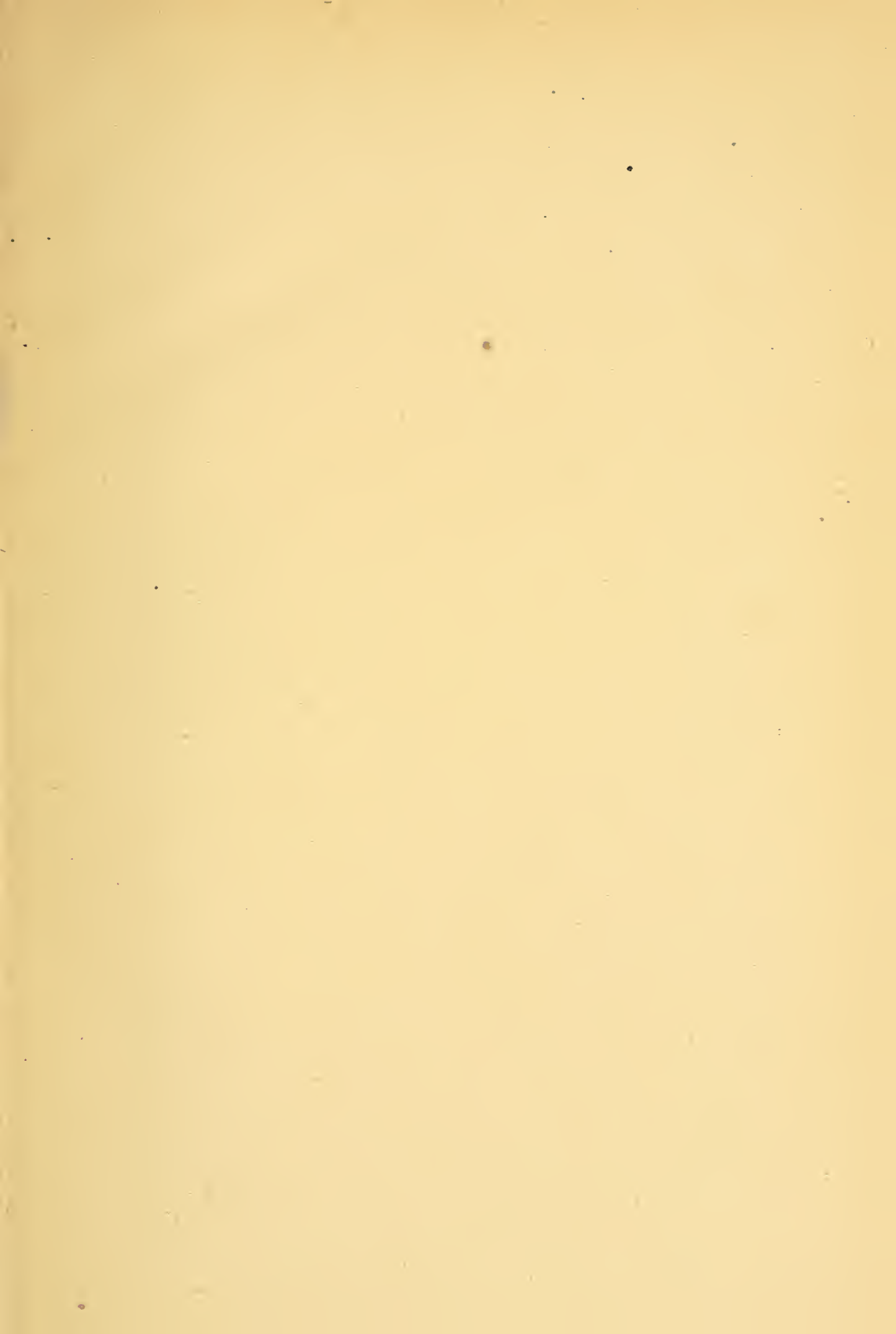
21. A. 246.





Digitized by the Internet Archive
in 2010 with funding from
Open Knowledge Commons and Harvard Medical School

<http://www.archive.org/details/healthresortsofc00soll>







FIRST VIEW—COLORADO SPRINGS AND PIKE'S PEAK.

ON SALE AT

HOWBERT BROTHERS,
Tejon Street, Colorado Springs.

J. H. EOFF,
Tejon Street, Colorado Springs.

P. BLAKISTON, SON & CO.,
1012 Walnut Street, Philadelphia.

units of
S. E. Solly

Price in paper cover, 25 cents

COLORADO SPRINGS

AND

MANITOU.

By S. EDWIN SOLLY,

M. R. C. S. Eng., L. S. A. Lond.

ALSO

A PRIZE ARTICLE,

DESCRIPTIVE OF

SCENERY, RESOURCES, ETC.

BY

MRS. SIMEON J. DUNBAR.



FIRST VIEW—COLORADO SPRINGS AND PIKE'S PEAK.

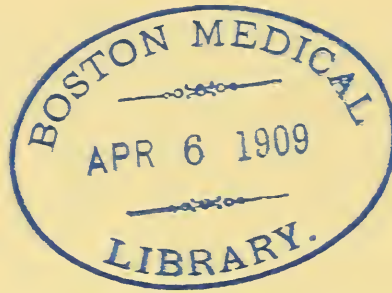
H. J. P. Hought
With Compliments of
THE HEALTH RESORTS S. E. Solly.

OF
COLORADO SPRINGS
AND
MANITOU.

BY S. EDWIN SOLLY,
M. R. C. S. Eng., L. S. A. Lond.

ALSO
A PRIZE ARTICLE,
DESCRIPTIVE OF
SCENERY, RESOURCES, ETC.

BY
MRS. SIMEON J. DUNBAR.



4915

THE GAZETTE PUBLISHING COMPANY,
COLORADO SPRINGS, COLO.

COLORADO SPRINGS AND MANITOU.

CONTENTS.

	PAGE.
<i>COLORADO SPRINGS</i>	4
EDUCATIONAL ADVANTAGES	8
TEMPERANCE FEATURES	10
WATER SUPPLY	10
SCENERY	11
<i>MANITOU</i>	14
SODA AND IRON SPRINGS	17
BATH HOUSE	17
<i>GENERAL FEATURES—</i>	
RIDES AND DRIVES	18
SOCIAL ADVANTAGES	29
BUSINESS	31
MANNER AND COST OF LIVING	33
CLIMATE	36
COMPARISONS	41
LOCATION AND TRAVELING FACILITIES	45

The Health Resorts of Colorado Springs and Manitou.

BY S. EDWIN SOLLY,

M. R. C. S. ENG., L. S. A. LOND.

TABLE OF CONTENTS.

CHAPTER I.

INTRODUCTORY.

Change of Climate.—Characteristics of the Individual.—Medication.—	PAGE.
Absence from Friends.—Medical Supervision. Exercise. - -	53-55

CHAPTER II.

GENERAL ESSENTIALS OF CLIMATES AND THEIR EFFECTS.

<i>Section I.—The Air.</i> —Purity.—Oxygen and Carbonic Acid.—Ozone.— Dust, Germs, etc. - - - - -	56-58
<i>Section II.—The Temperature.</i> —General Causes of Heat. General Causes of Cold.—Local Causes of Heat.—Local Causes of Cold.— The Mean Annual Temperature.—The General Effects of Heat and Cold. - - - - -	58-60
<i>Section III.—Humidity.</i> —Absolute Humidity.—Relative Humidity.— Clouds Rainfall.—Snow.—Evaporation.—Action in Health and Disease.—Increased Venosity.—Increased Arteriosity.—Modifying Influences of the Body.—Effects of Humidity with Heat —Effects of Humidity with Cold. Humidity of the Soil. Effects of Sud- den Increase of Humidity. - - - - -	60-69
<i>Section IV.—Light.</i> - - - - -	69
<i>Section V.—Density, Pressure and Weight of the Air.</i> —According to Latitude.—According to Altitude.—The Periodical Variations.— The Unperiodical Variations.—Causes of Barometric Changes.— The Physiological Effects of Increased and Decreased Pressure.— Tolerance of Alcohol —Balloon Ascents.—Great and Sudden Changes of Pressure.—Currents and Winds.—Mountain and Valley Winds. - - - - -	69-75
<i>Section VI.—Electricity.</i> - - - - -	75
<i>Section VII.—Configuration of the Ground</i> — Plains — Mountain Ranges. Elevated Plains.—Valleys.—The Aspect. - - -	75-76
<i>Section VIII.—Nature of the Soil.</i> - - - - -	76-77

CHAPTER III.

ELEVATED CLIMATES.

<i>Section I. Physical Peculiarities</i> —Rarefaction—Coolness of the Air— Dryness of the Air—Movement of the Air—Aseptic Air—Increased Light.—Increased Ozone.—Positive Electricity.—Dryness of Soil.	77-78
--	-------

TABLE OF CONTENTS.

vii

<i>Section II.—Physiological Effects—Skin—Circulation—Lungs' Respiration—Lungs' Excretion—Appetite and Assimilation—Nourishment—Nervous and Muscular Systems.—Sleep.—Change of Substance.</i>	PAGE. 78-79
<i>Section III.—Pathological Conditions.—Diseases Common.—Diseases Rare.</i>	79
<i>Section IV.—Therapeutic Application. Diseases Favorably Influenced.—Diseases Unfavorably Influenced.</i>	79-81

CHAPTER IV.

GENERAL THERAPEUTIC APPLICATION OF ELEVATED CLIMATES TO PHTHISIS.

<i>Section I.—General Constitutional Conditions.</i>	81
<i>Section II.—General Topical Conditions.—The Essentials of the Healing.—The Method of Healing.</i>	81-82
<i>Section III.—The Zone of Immunity.</i>	82-83
<i>Section IV.—Suitable Conditions. — Predisposition. — Various Conditions.—Pneumonia.—Bronchial Catarrh.—Pleurisy.—Tubercles.—Cavities.—Throat Catarrh.—Night Sweats.—Fever.—The Circulatory Functions.—Hemorrhages.—Diarrhœa.—Asthma.</i>	83-86
<i>Section V.—Unsuitable Conditions.—Temperament.—Advanced Cases.—Hereditary Cases.</i>	86
<i>Section VI.—Exercise.</i>	86-87
<i>Section VII.—Statistics of Cases.</i>	87-88
<i>Section VIII.—Time of Stay.</i>	88
<i>Section IX.—Further Treatment.</i>	88

CHAPTER V.

COLORADO SPRINGS.

<i>Section I.—Situation.</i>	89-91
<i>Section II.—Drainage and Water Supply.</i>	91-92
<i>Section III.—Population and Death Rate.</i>	92
<i>Section IV.—Walks, Accommodations, Amusements, Etc</i>	92-93
<i>Section V.—Accessibility, Vicinity, Etc.</i>	93-94

CHAPTER VI.

WEATHER AT COLORADO SPRINGS.

<i>Section I.—Winter.—Sunshine.—Snowfall.—Soil.—Sleighing.—Skating.—Movement of the Wind.—Velocity of the Wind.</i>	94-96
<i>Section II.—Spring.</i>	96-97
<i>Section III.—Summer.—Temperature by Day.—Evaporation.—Temperature by Night.—Rainfall.—Thunder Storms.—Humidity.</i>	97-98
<i>Section IV.—Autumn.</i>	98
<i>Section V.—Comparative Weather.</i>	98-99

<i>Section VI—Weather Report.</i>	- - - - -	99-107
WEATHER TABLES.—Table I, Mean Temperature.—Table II, Maximum and Minimum Temperatures in Winter and Spring. — Table III, Maximum and Minimum Temperatures in Summer and Autumn. — Table IV, Effect upon the Monthly Means of the Omission of Five Days of Extreme Temperature.—Table V, Cloudiness and Rainfall.—Table VI, Wind; Proportionate Frequency. —Table VII, Wind; Mean Diurnal Variation.—Table VIII, Comparative Weather Tables.—Table IX, Comparative Velocity. —Table X, Comparative number of Clear, Fair, and Cloudy Days at Davos and Colorado Springs. - - - - -		
		108-111

CHAPTER VII.

PHYSIOLOGICAL EFFECTS OBSERVED AT COLORADO SPRINGS.

Skin.—Circulation.—Lungs' Respiration.—Lungs' Excretion.—Appetite and Assimilation.—Nourishment.—Nervous and Muscular Systems.—Sleep.—Change of Substance. - - - - -	112-120
--	---------

CHAPTER VIII.

PATHOLOGICAL CONDITIONS AT COLORADO SPRINGS.

<i>Section I.—Diseases Common.</i> —Various Conditions.—Acute Pneumonia.—Mountain Fever. - - - - -	120-121
<i>Section II.—Diseases Rare.</i> —Chronic Pneumonia.—Phthisis.—Hæmoptysis.—Scrofula.—Hemorrhoids.—Intermittent Fever. - - -	121-123

CHAPTER IX.

THERAPEUTIC APPLICATION OF THE CLIMATE OF COLORADO SPRINGS.

<i>Section I.—General Diseases.</i> —Anæmia and Chlorosis.—Results of Malarial Poisoning. — Acute Rheumatism.—Chronic Rheumatism. 123-124	123-124
<i>Section II.—Diseases of the Nervous System.</i> —Lunacy.—Hysteria.—Sleeplessness — Headache. — Chorea. — Paralysis. — Epilepsy.—Asthma. - - - - -	124-126
<i>Section III.—Diseases of the Abdominal Organs.</i> —Sluggish Circulation of the Abdominal Organs.—Liver.—Kidney Diseases.—Dyspepsia. 126-128	126-128
<i>Section IV.—Diseases of the Circulatory Organs.</i> —Heart Disease.—Aneurism. - - - - -	128-129
<i>Section V.—Diseases of the Respiratory Organs</i> —The Throat.—Chronic Bronchitis.—Acute Bronchitis—Chronic Pleurisy.—Acute Pleurisy.—Chronic Pneumonia.—Acute Pneumonia. - - - - -	129-130
<i>Section VI.—Phthisis.</i> —General Constitutional Conditions.—General Topical Conditions.—Circulation.—Nervous System.—Temperament and Fever.—Hemorrhages.—Advanced Cases.—Influence of General Surroundings.—Length of Stay —Change of Locality. - 130-136	130-136

CHAPTER X.

MANITOU.

The Climate.—The Springs. - - - - -	136
-------------------------------------	-----

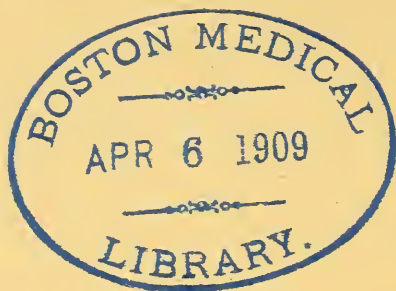
COLORADO SPRINGS

AND

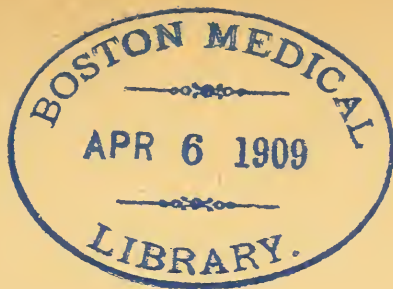
MANITOU,

BY

MRS. SIMEON J. DUNBAR.



In the spring of 1883 a prize of one hundred dollars was offered by a committee of the citizens of Colorado Springs and Manitou for the best article upon these two towns as places of residence and health resorts. Numerous articles were presented and several were of marked merit. Rev. Willis Lord, D. D., and Rev. James B. Gregg, the examining committee, adjudged the prize to Mrs. Simeon J. Dunbar, a resident of Colorado Springs for the past two years and a correspondent of the Boston press. Mrs. Dunbar has sought to prepare such a statement of facts as she would have welcomed (and believes others desire) when she contemplated making a home in the New West; in this endeavor she has been eminently successful. It is believed that this is the most complete, compact and accurate body of practical information in print concerning these two places, which are becoming more popular every year; and that it will be of great and permanent value to all persons seeking a change of climate or proposing to visit or settle in Colorado.



COLORADO SPRINGS AND MANITOU.

*

PIKE'S Peak Range is the most eastern spur of the Rocky Mountains, taking its name from the peak which rises high above the rest of its range 14,150 feet above sea level. This eastern sentinel of the vast Rocky Mountain system has its advance-guard directly in front, of cones and peaks and great shapeless masses of rock and earth, terminating in the south in Cheyenne Mountain, and in the north in a long chain of lower mountains. Twenty-five miles north from the base of Pike's Peak, a ridge of hills about 8,000 feet high called the Divide—the water shed between the Arkansas and Platte Rivers—shoots out into the east for seventy-five miles, its blue-black outline cut sharply on the northern sky.

On the south, west of Cheyenne Mountain, extends the Greenhorn Range, and nearly a hundred miles away the sharp eye will detect the outline of the Spanish Peaks almost upon the New Mexico line.

Out from this semicircle of hills and mountains stretch the great plains beyond the distant eastern horizon; not suddenly and in one smooth slope, but foothills and small broken mesas end in scattered and irregular bluffs, these gradually blending and losing themselves in the billowy, rolling country which makes up the eastern plains of Colorado.

COLORADO SPRINGS.

On one of these small mesas close to the foothills and within the first line of bluffs, is situated Colorado Springs, on a level with the summit of Mt. Washington in New Hampshire, 6,000 feet above the sea.

Neither nature nor art could design and lay out a more finished and beautiful spot for a town. Nature has made the grading perfect for streets and sidewalks, for drainage and for irrigating ditches. The whole town appears perfectly level, but the mesa has just enough descent towards the south and east to take water from the main irrigating ditch as it enters the town from the north-west, and carry it freely throughout the whole city on each side of every street; four of the main streets and avenues have twelve miles of open boxed ditches about two feet wide running in absolutely straight lines. The lawns and gardens are graded and laid out to correspond with the grade of the ditches, from which they are flooded once a week by a box ditch running under the sidewalk.

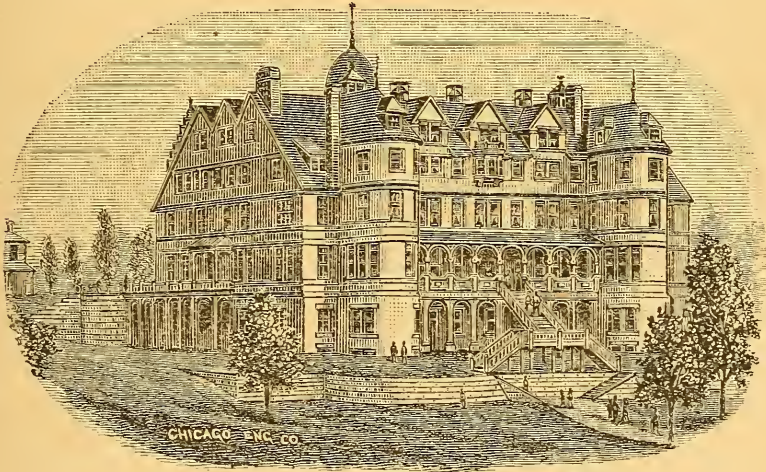
The town was founded in 1871 by a colony composed mostly of gentlemen from Philadelphia who were then projecting and building the Denver and Rio Grande Railroad from Denver. The town plat is three miles long and two wide, laid out in blocks four hundred feet square, separated by streets one hundred feet wide, and every third street an avenue one hundred and forty feet wide. These streets and avenues are bordered by rows of flourishing cottonwoods, twenty-five feet apart, that greedily drink the water running over their roots through the spring and summer. The grass on the sides of these small irrigating ditches is green all summer and sprinkled

SECOND VIEW—COLORADO SPRINGS AND PIKE'S PEAK.



with bright blossoms, and, with the grateful shade of the cottonwoods, makes pleasant walks through the city which is full of beautiful homes.

The houses are built of wood, stone and brick, put together in all styles, varieties and combinations of architecture, there are hardly two houses alike in the city, and with combinations of colors as various. Everywhere are well kept gardens and beautiful lawns, for the people like pleasant and large yards as well as wide streets and walks. Each householder takes pride in keeping up his place, even the plainest, and it is a rare thing



THE ANTLERS, COLORADO SPRINGS.

to find a shabby house and yard. More than half of the dwellings are cottages, but there are many large and handsome houses, notably in the north part of the city which has been built up rapidly within the last two years. There are several elegant stone residences costing from twenty to forty thousand dollars.

The public buildings are remarkably fine for so young and small a city. The new hotel—The Antlers, the El Paso Club building, the high school building and Colorado College are built of a fine beautifully pink-tinted stone taken from the Manitou quarries. The city hall and business blocks are substan-

tial structures, and the opera house, a fine brick building, is a gem inside, perfect in its arrangements, and fitted and furnished with exquisite taste; it is small, having a seating capacity of about eight hundred, but large enough for the city at present, and is unsurpassed by any similar building in the country. The Deaf-Mute Institute, a state institution, is situated on a slight elevation east of the city and is a large stone building.

There are two public parks, each with its shaded walks, rustic seats and band stand. College Square, recently artistically laid out will, in time, become another pleasant park. To all appearances everything that is done has for its object the added beauty and attractiveness of the city.

The churches are all wooden buildings except the Baptist and Catholic which are built of brick, and the Episcopal which is built of stone. Nearly all denominations are represented here except the Unitarian and the Universalist. Members of these denominations will find congenial views and liberal thought in the social and religious life of Colorado Springs, and also in some of the pulpits.

EDUCATIONAL ADVANTAGES.

From the foundation of the colony the people have been interested in education; one of the earliest acts of the citizens was to vote a large appropriation for the erection of a fine public school building of stone. The schools are well graded and well taught; the teachers are graduates of eastern normal schools. There are two primary schools, one grammar and high school combined, and private schools.

One of the most important and complete educational institutions of the New West—Colorado College—is located here. When the town site was laid out the Colorado Springs Land Company reserved a site for a college, and lands in a valuable part of the town to be devoted to educational purposes. This property was granted to the corporation of Colo-

rado College, founded in 1874. The New West Education Commission which established and now supports schools in Colorado, Utah and New Mexico was at first connected with this college and is an outgrowth of it. Outside of a few liberal citizens, Colorado College has been built and is still largely supported by friends of education in New England.

The course of study is very similar to that of eastern colleges including, besides its four years course for the degree of Bachelor of Arts, complete Preparatory and Metallurgical departments, the latter including especially assaying, chemical analysis, blowpiping and determinative mineralogy. This department besides preparing young men for mining pursuits is particularly adapted to and patronized by men who are interested or working in the mines in summer, and who wish to pursue in winter scientific studies relating to their work.

The number of students in all the departments at present is about one hundred. Last year—1882—it graduated its first class.

The board of instruction is excellent, and includes the president and six professors, all graduates of New England colleges except the professor of metallurgy, who is a graduate of the Columbia School of Mines.

A boarding house is connected with the college, and tuition and living are reduced to the lowest cost. Out door work is provided for young men, and in door work for young women who wish to earn enough to pay part or all of their expenses.

Colorado Springs offers every advantage in an educational direction, the "accomplishments," as well as the solid foundation of the grammar and high school instruction, followed by the college course, open to both sexes. Excellent teachers of painting, drawing and music find many pupils here. Much attention is given to studying and painting the flora of the vicinity.

We have two good book and picture stores where are found all the latest publications, and everything in the magazine line, American and English, and the leading newspapers of the country.

The opera-house managers offer the people the best of everything that comes this way; during the last season we have had Barrett, the Boston Quintette Club, Emma Abbott, Janauschek and several good troupes; excellent home talent has appeared before the curtain and Oscar Wilde smiled upon us and drew a full and critical house.

TEMPERANCE FEATURES.

There are no saloons and bars in the city for this is a temperance town. The colony, after receiving the United States title to the town plat, incorporated the following strong provision into the deed of every lot and piece of ground thereafter sold:—

“That intoxicating liquors shall never be manufactured, sold, or otherwise disposed of, as a beverage, in any place of public resort, in or upon the premises hereby granted.”

Provision was also made in all deeds that if these conditions were violated, the land and buildings thereon should revert to the original owners. There have been violations of this clause, and the courts of this state, and the Supreme Court of the United States having decided in favor of the provision, valuable property has been lost to the owner.

WATER SUPPLY.

A complete system of water works supplies the city with the purest water brought seven miles in pipes from Ruxton's Creek, beyond Manitou, a clear, pure stream abundantly fed by the springs and melting snows of Pike's Peak. The same pipes passing through Manitou supply that town and its hotels with water.

A distributing reservoir on a mesa considerably higher than the city mesa and two miles distant, receives the water. This gives a fine head and good protection against fire. Hydrants are placed a few hundred feet apart, and three efficient fire companies have only to attach the hose to throw water over any building.

Besides the temperance provisions for the social benefit of the town, the colony at the same time wisely provided for its permanent improvement and beauty, by setting apart the proceeds, above cost, of a large portion of the lots first sold, for the construction of an irrigating canal, and the planting of trees throughout the city ; for trees and vegetables do not grow on these mesas and plains without irrigation. This ditch takes water from the Fountain a short distance below Manitou, and, winding round the foot hills and mesas to keep its grade, extends for a distance of thirteen miles before it reaches Colorado Springs. From this point, as already stated, branches extend to all parts of the city, and to the vegetable gardens on the outskirts.

The city is lighted by gas ; the principal business street has a line of herdics, and telephone wires connect all parts of the town.

SCENERY.

The scenery about Colorado Springs, embracing the mountains and the plains, is grand and beautiful. On the western side the mesas skirt the foothills, these swell to mountains which rise one above another till the magnificent dome of Pike's Peak stands alone above them all, "forever to claim kindred with the firmament, and be companioned by the clouds of heaven." The whole mountain is one barren mass of rock as we see it from the town, for the eastern face is open to us almost down to the foothills ; deep perpendicular gorges and terrible ravines reveal themselves by narrow white rifts, snow

hidden so deep that the sun cannot reach it. And yet among those piled-up rocks and in the seams and gorges, most beautiful flowers grow, tiny creatures, gorgeous in purple and gold, hugging their stern friends closely. Even on the very top they grow and push their little faces out of the snow to give an unexpected welcome to the stranger who climbs to their high home.

The summit is seldom if ever without its covering of snow; and often in midsummer before the burning sun has quite had time to melt away the last thin folds, a cloud will stoop and spending itself in love and pity, leave a white mantle there.

Cameron's Cone, to the left of the Peak, its summit not above timber line, defines itself clearly against the sky in strong, dark contrast to its lofty neighbor.

To the left of the Cone and rising a little higher is Mt. Garfield, and behind Mt. Garfield's southern slope the rounded summit of Bald Mountain peers, white headed or bald as the snow covers it or melts away. Then for a space cones and curves give place to sharp ridges and angles, a group of these having for its queen Mount Rosa, a mountain as beautiful as its name. It is named for Rose Kingsley, the daughter of the late Canon Kingsley of England. During the winter of 1871 Miss Kingsley and another lady were the only women in the colony just established at Colorado Springs.

Cheyenne Mountain is the last but not the least, for next to Pike's Peak it attracts the most attention. It is a gigantic inland promontory projecting into the ocean of the plains, out into the quiet places, beyond the incoming wave-like foothills.

Mountain slopes and numberless foothills are continually discovering themselves in new folds and shapes with every hour of the day. Lights and shadows and changing clouds bring out undreamed of hills and rocks and the colors shade from black and gray to ochre and vermilion. Deep folds and

overlappings mark the cañons and the course of streams. A dense black moss, as it appears to the naked eye, covering some of the slopes and delicately fringing summits and sharp ridges, is in reality a heavy growth of timber, the sturdy pine, the tree beloved of Shakspeare. They cling mostly to the southern slopes, leaping the northern ones to climb the south slope of the next fold, sometimes leaving behind in their hurry a few stragglers whose scrawny branches seem pitifully beckoning their companions to wait.

No high mountains hide the right hand or northern slope of the Peak ; but the high hills run up to the Divide which limits the view in the north.

Down from the Divide comes the Monument, its muddy waters sometimes overflowing the banks after a short and heavy rain. These waters that quickly gather as quickly fall, and during most of the year the river follows its winding way in order and in quiet. It runs close to the foothills, through broken mesas, past ledges and curious rock formations of "monuments," ruined castles and cathedrals, and solitary sentinels; through parks of pine and the scrub oak where in early spring the anemones and mountain lilies bloom, and where in summer the grass is filled with wild roses white and red, and mottled pink and white, purple asters, golden rod, the coral-like gilia, the delicate evening primroses and a host of other flowers as beautiful. The thirsty cottonwoods, the alders and the willows come to its banks to drink; and so the Monument winds its way cutting the city mesa from one to the west a hundred or more feet higher, past the city turning to the southeast, and mingling its waters with the Fountain which here flows quietly but whose headwaters have come rushing and tearing down the mountain sides.

Turning from the mountains the scenery is entirely different. Nothing but broad rolling plains extend to the

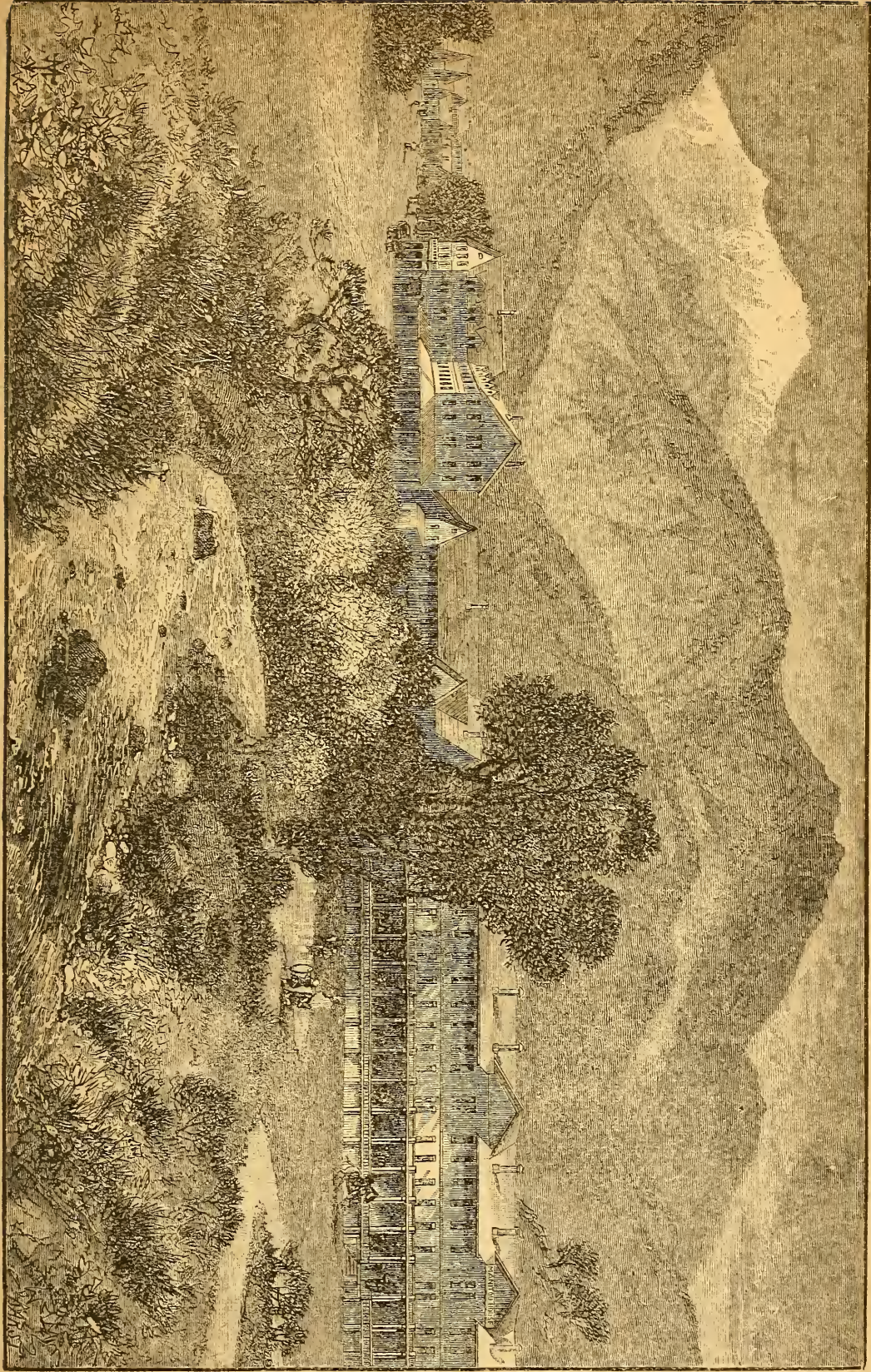
horizon, broken here and there by low bluffs up whose jagged sides trails a stunted growth of pines, the only trees to be seen anywhere.

The nutritious grama grass covers the plains, clothing them in a yellow brown garment nearly the whole year; for it is only for a little while in the spring and during the rainy season in July and August that the grass is green. From the mesa west of town, or from the bluffs, a much wider view of the plains is obtained, and one almost believes that the ocean lies in the distance. The moving cloud shadows give an appearance of motion to the billowy plains, and the distant bluffs are like white-capped waves rolling leisurely in from the great wide ocean. Then sometimes the smoke from Denver and Pueblo can be seen, reminding one of ocean steamers just coming into sight.

Perhaps the pleasantest picture of the plains is sometimes at sunset, when the city lies in the shadows of the mountains which stretch for miles across the plains while between the shadows are floods of sunlight, and the eastern sky has all the sunset hues.

MANITOU.

Five miles west of Colorado Springs, in the midst of the hills, lies Manitou at the foot of Pike's Peak in the beautiful valley of the Fountain, out of whose banks bubble the mineral springs that have made this place the most fashionable summer resort of the West. It is a small and quiet town in itself of about five hundred inhabitants, with churches, and schools, and pleasant residences, and four large, first class hotels. During the summer months it swarms with life; its hotels overflow and private houses take in the strangers; summer cottages



and tents are perched like birds' nests on the hillsides, among the rocks and in the cañons, and in every available place.

SODA AND IRON SPRINGS.

The Fountain is a stream of clear, swift running water that comes from high up among the mountains, through Manitou Park and down through the Ute Pass, forming there the beautiful Rainbow Falls. Ruxton's Creek, flowing down Engleman's Cañon, joins the Fountain at Manitou. In this cañon of remarkable beauty are several iron springs, the best known and oftenest visited being the Iron Ute. On either bank of the Fountain are scattered the other springs. Their abundant waters overflowing into the Fountain have colored the rocks and earth with the mineral matter which they contain. Rocks near the Iron Ute look like huge blocks of iron. About the Shoshone, rocks and earth are clothed with a yellow mosslike crust. Down the sides of the Navajo and Manitou the water trickles over rocks that are white with soda, and striped with green and peacock blue.

There are six or seven springs in all. Their Indian names and legends are all that remain to remind us of our red brothers whose offerings to the "Manitou" of the "medicine waters" filled the basins of the springs and hung from the neighboring trees and bushes when the "pale face" invaded this their favorite camping ground. The springs differ much in their properties of iron, sulphur and soda. Some of the waters are taken as a pleasant draught; others should be used only as a medicine, taken when needed and then discontinued; their temperature varies from 43° to 56° F.

BATH HOUSE.

Pipes convey the water from some of the springs to the bath houses. A large bath house has just been completed, fitted with every modern convenience and aid to health and comfort. It is two stories high, with wide piazzas and balconies.

On the first floor are the bathing rooms, parlors and dressing rooms; above are reading and reception rooms, and the physician's office. No expense has been spared in making it complete in every particular.

The surroundings of Manitou are particularly charming, and without its mineral springs it would be a favorite resort. Mountains, high and low, shut it closely in. Joined hand in hand like a company of eager children, they press and crowd around the lovely spot, those outside peering over the heads and shoulders of their companions. Calmly the grand old Peak looks over them all, down into the loveliest places.

GENERAL FEATURES.

Such are the surroundings of these two beautiful towns. The many attractions in these surroundings are reached by good and pleasant roads. There are several livery stables in both towns that supply at moderate prices horses and carriages and excellent saddle horses; horseback riding is a favorite amusement here. Pleasure parties are always on the roads and mountain trails in summer and in winter, and the picnic season commences very early in the spring.

RIDES AND DRIVES.

The bluffs are parklike with many windings between waterworn and weathered rocks of queerest forms that rise among the trees and bushes. In Austin's Bluffs the road leads up on to the top where may be had a most magnificent view of the mountains and plains and the city. From the top the road runs down the outer slope on to the plains over which there is a long pleasant road to the city.

The mountains hold in their arms beautiful parks, meadowlike in their luxuriant growth of grass and flowers, with lakes

and ponds and brooks. In the folds of their garments are cañons, rock-bound and awe-inspiring in their stupendous height and depth; cañons filled with the sunshine and all that is beautiful in flowers and trees and gentle waters. Hidden in their bosoms are caves and caverns where the sun never penetrates, but full of wonderful beauty and grandeur.

Close around Manitou are several points of beauty and interest, many within short walks of the hotels.

The Manitou Trail to Pike's Peak runs up Engleman's Cañon, down which come tumbling the waters of Ruxton's Creek. This saddle route to the Peak is the shortest and most frequented; in its rapid and narrow ascent to Lake Moraine the scenery is very fine, and there are choice bits which are unequalled in mountain views.

The Ute Pass, following up the course of the Fountain, was an old Indian trail into the parks and mountains higher up. Later on, in the gold excitement of 1859, when the rush was made to Pike's Peak, and later still, after the unprecedented excitement and the settlement of Leadville, before the railroad was built, the Pass was thronged with camp trains pushing their way into the mountains. Now the tourist, the pleasure seeker and the invalid go leisurely over a good road to pass a delightful summer among the beautiful parks through which it leads. One of these is Manitou Park, which is a summer camping ground much frequented. The situation is very delightful and its summer hotel is good.

Williams' Cañon, unlike each other as the cañons about here are, has but the one feature that is common to them all, the water bed. Narrow at the bottom, the sides rise suddenly upward with a backward slope and then the walls rise perpendicularly in horizontal layers of solid rock one above another for several hundred feet. This cañon is remarkable for its many geological features; it extends a long way into the mountains and can be traversed for more than three miles.

The tourist usually stops, however, near the Cave of the Winds, whose entrance is a small opening high up on one side, and is reached by a succession of stairs. A party of students from the college was one day exploring the cañon and discovered this cave, which has become famous for the wonders it contains: its large and its delicate stalagmites and stalactites, its avenues and beautiful rooms of flowering alabaster, its organ pipes giving out sweet sounds, its bridal chamber and its heights and depths.

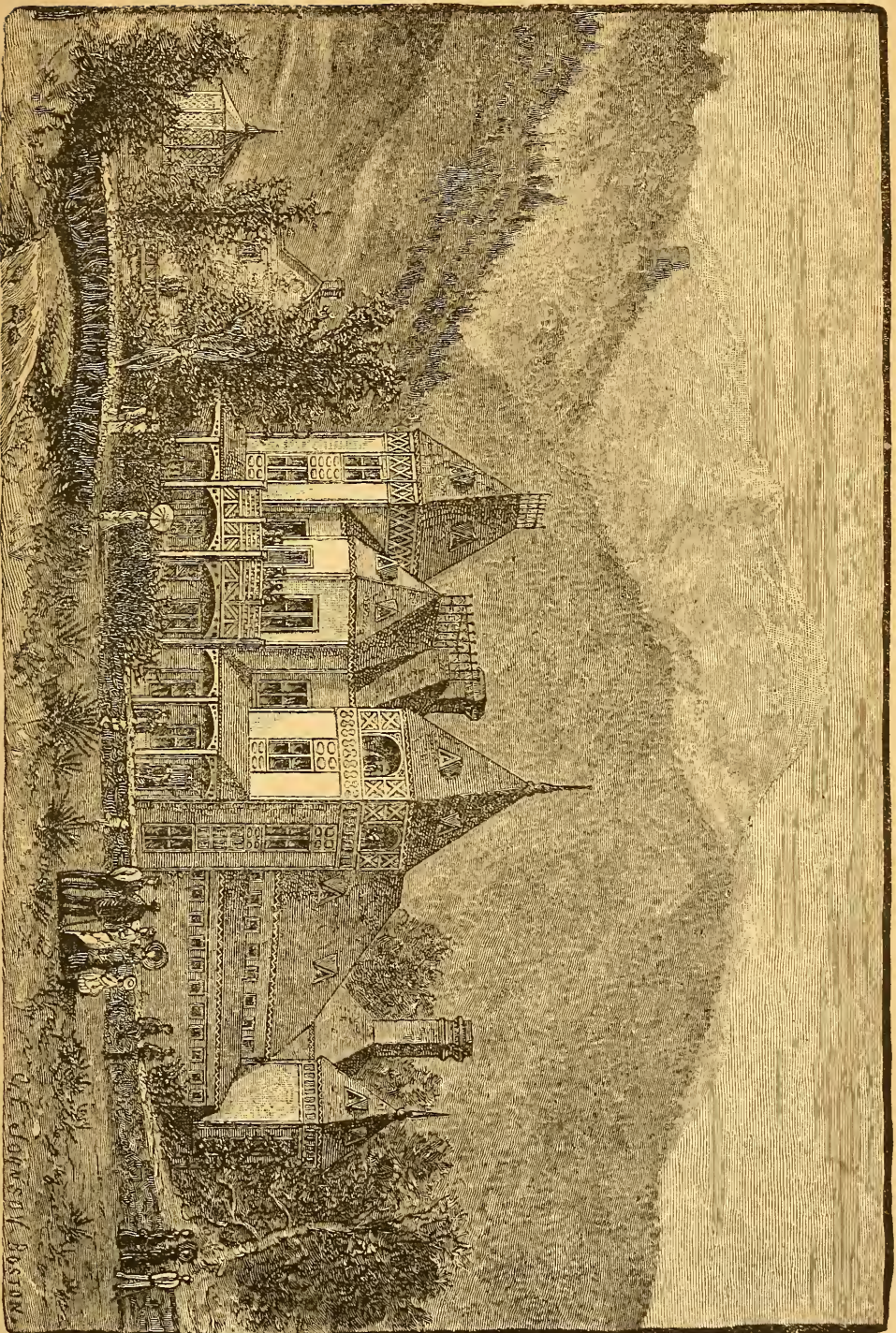
The road to Crystal Park, which lies at the base of Cameron's Cone and about 1,500 feet above Manitou, can be traced winding its steep way up among the hills. The gateway to this lovely spot can be plainly seen from Colorado Springs.

As the Fountain makes its way to the plains the valley widens and the road through it to Colorado Springs is very pleasant. Just out of Manitou the road to the Garden of the Gods strikes off to the left. Red and Bear Creek Cañons lie off to the south, each wonderful in its distinct peculiarities,—the great red rocks of Red Cañon, giving to it its name; Bear Creek's sparkling waters and many falls, bordered with flowers and trees.

On the left of the road as we approach Old Town huge masses of rock begin to loom up with others rising higher still further north, marking the location of the Garden of the Gods. They run in parallel lines from north to south in long sloping ridges or broken solitary rocks. East of the rocks rises the mesa beyond which lies Colorado Springs.

Colorado City, or Old Town, the oldest town in the state and once the capital of the territory, lies on the road about half way between Colorado Springs and Manitou. Settled in '59, during the Pike's Peak excitement, it has been a busy, flourishing town, but now, in its old age, has settled down to the quiet of agricultural pursuits, good hay and pasture lands surrounding it.

MANITOU BATH HOUSE.



From the brow of the mesa across which runs the "mesa road" from Colorado Springs, there is a fine view of the Garden of the Gods. Below the mesa, two hundred feet, is the valley of Camp Creek, a small stream flowing out of Glen Eyrie across the valley on the right; a rent in the hills makes a spot of great natural beauty with many of the rock formations peculiar to the neighborhood; out of this beautiful reception room is Queen's Cañon, a grand gallery of rocks. In the midst of the beauties of Glen Eyrie is built an elegant private residence.

Out of the valley further south rise what once must have been two or more solid and continuous ridges of rock; now they are broken and separated, rising out of the earth in graceful swells, long and narrow waves that follow down the valley in a line. Who can tell when and "by what furnaces of fire the adamant was melted, and by what wheels of earthquake it was torn, and by what teeth of glacier and weight of sea-waves it was engraven and finished into its perfect form?" Up the slopes of some the earth and grass have crept; into the rifts and clefts the wind has carried the dust and seeds, and out of these crevices Nature, ever trying to make her works beautiful, has brought forth shrubs and flowers and here and there a tree. Back of these great rock waves rise the two huge slabs that form the gateway; they stand one hundred feet apart; and rise nearly four hundred feet perpendicularly. A rock *comparatively small* stands between them dividing the entrance. The right hand rock is a thousand feet long and three hundred and sixty feet high. In shape it resembles a camel crouched down to rest. This is a dark red sandstone having a smooth and polished appearance; in the sides are numberless holes, weatherworn, which make the homes of birds that are always circling around. The rock is so high and narrow that, looked at from the north, it forms a cluster of thin, graceful pinnacles.

The other rock is thicker and rougher, a ragged pine or two finding a foothold on its sides ; in coloring it is a greenish gray. A long white ridge of rock lying between the red rock and a ridge of green, and clumps of foliage on the uneven ground, make contrasts of color whose effect is indescribable ; through the gate, in the distance, is seen Pike's Peak rising almost directly out of the foothills that roll down into the Garden.

Within the gate are grassy knolls, and shrubs, and flowers in their season, and rocks of all sizes and every imaginable shape, that are variously named in the tourist and guide books. Again and again we go to the Garden, by sunlight and by moonlight, and each visit only emphasizes the pleasure of the preceding one.

Blair Athol, about six miles northwest of Colorado Springs, is very lovely with its columns and masses of pink sandstone mingling with its groves of pine.

Monument Park explains itself, filled with queer shapes and monuments of rock, and to some it is the most attractive of all the parks. Groups and companies wander through the pleasant paths and climb the hillsides ; the "Anvil" is left alone ; the "Quaker Wedding" is well attended ; the "Gypsies" are camped near the "Colonnade ;" the "Organ" is silent now, and many are hastening to the "Pantheon."

The two Cheyenne Cañons are gorges between Cheyenne and Mount Rosa and run back to the base of St. Peter's Dome.

South Cheyenne is deep and narrow and nearly a mile long, with perpendicular walls of solid granite rising hundreds of feet and in places over a thousand feet, naked and smooth with only occasional rifts. It is winding in its course and narrows into gloomy rockbound cells or widens into pleasant amphitheatres. A small stream runs quickly through the narrow rocky bed, pushing out around great boulders and leaping



PACK TRAIN, UTE PASS.

over the small ones, forming innumerable cascades that foam and gurgle and sing low quiet songs. At the head of the cañon the water falls three hundred feet, vainly trying to find a resting place in its seven leaps to the bottom. Stairs have been built to the top of these falls where are grand views of the cañon and the plains.

North Cheyenne is wider and more open ; its rock walls, broken and sloping, freely admit the sunshine and give room for a wider stream and more vegetation. The wild beauty of this cañon is as attractive to many as the grandeur and depth of the other.

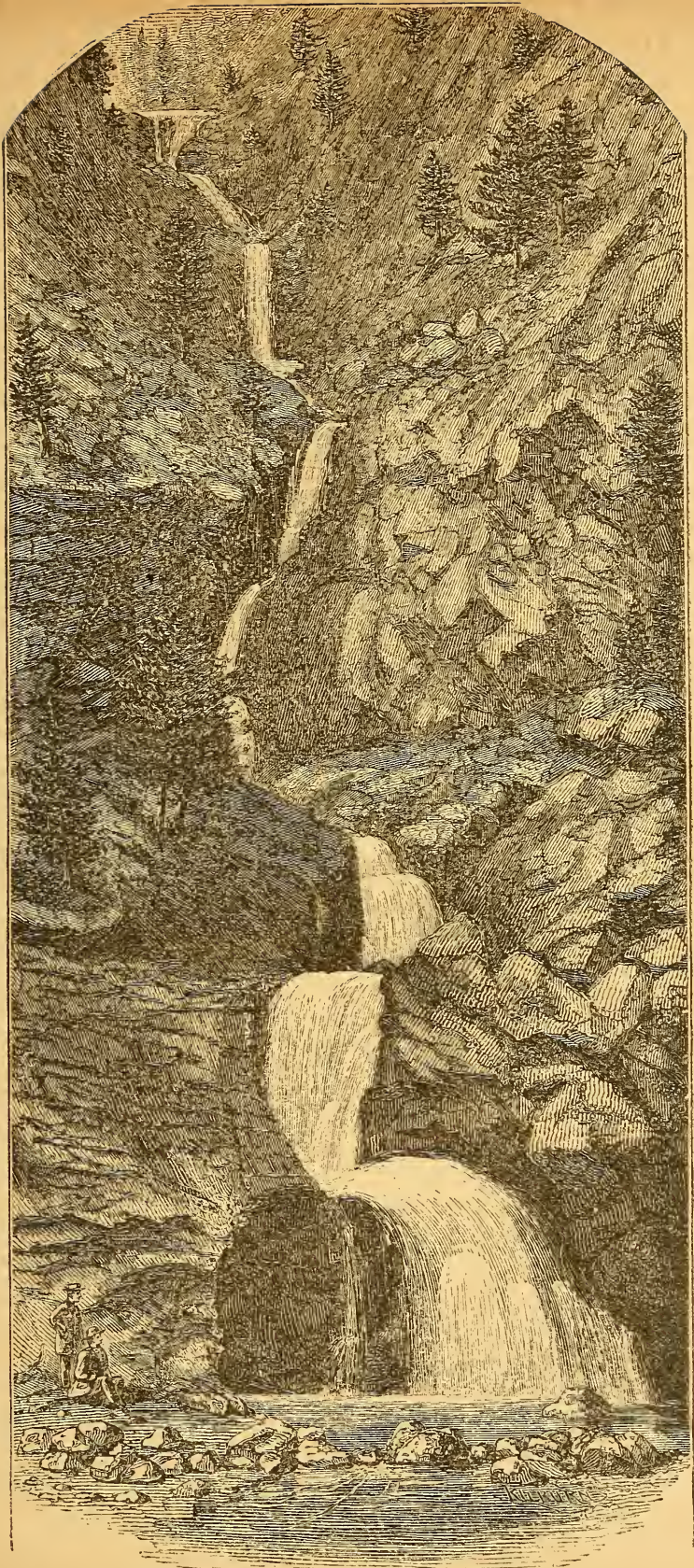
Trees grow in both the cañons wherever they find room. Great pines reach up to find the sunshine; they group themselves in little groves, and go hand in hand along the narrow paths. The spruce and cottonwood grow with them; close to the water the purple and the yellow columbines grow in great profusion, and the white and the purple clematis run riot over the rocks and bushes.

This is but a meagre glimpse of these two cañons, for they are both fine illustrations of the cañons of Colorado.

Cheyenne Toll Road, a carriage road to Seven Lakes, has been pronounced the most beautiful mountain road in the United States, and perhaps in the world. It runs over Cheyenne Mountain, up nearly to the top of St. Peter's Dome, giving magnificent views of the mountains, the cañons, the city and the plains. It winds around the mountains and over them, through heavy growths of timber, the piñon, the cedar and the pine, through beautiful parks and groves of aspen, up and down steep slopes, to an elevation of more than eleven thousand feet, almost to timber line; then down and up again till Seven Lakes is reached, a horse shoe basin partly encircled by the almost perpendicular walls of Bald Mountain.

In this favorite summer resort are seven sheets of exquisitely clear water varying in size, the largest covering fifty or sixty acres. These are the highest lakes in the Rocky Mountains; higher up, five miles by trail the summit of Pike's Peak is reached. At the log hotel at Seven Lakes, which will comfortably accommodate twenty-five or thirty guests, horses and burros are provided for ascending the Peak; from this point the trip to the Peak and return is easily accomplished in a day.

The whole trail above timber line is among "ragged, jagged rocks," a winding, narrow, stony path safe only for the surest footed animals and people of strong nerves. But, having once reached the summit where is the highest weather



SEVEN FALLS, CHEYENNE CAÑON.

signal station in the world, "the picture of the world outspread" is one never to be forgotten.

Space will not allow the description it should have of the ocean of mighty, storm tossed mountain waves piercing the clouds and heaven with their snowy crests ; these to the north, the west, the south ; to the east an ocean as vast of the quiet, peaceful plains blending with the dim, far off horizon.

Besides the Cheyenne Toll Road, the Manitou Trail and the old Government Trail through Bear Creek Cañon to the Peak, a fourth way of reaching the summit is in contemplation. The Pike's Peak Railroad and Improvement Company has just been organized for the purpose of constructing a mountain railroad or a tramway, which project, if successfully carried out, will give the quickest and easiest way of ascending the Peak.

SOCIAL ADVANTAGES.

Colorado Springs and Manitou are identical in their interests, and cannot be separated in their advantages and prosperity ; and what shall be said of the social, educational and religious qualities of the Colorado Springs people will be true also of the people of Manitou.

The society is the very best ; people of culture and refinement, and many possessing much wealth, have been attracted here by the climate and surroundings, and these have drawn others of like tastes and habits, till on this little mesa where the mountains and the plains meet, there has grown up in a few short years a city of nearly six thousand people, "the cream of eastern society." Although Colorado Springs is pre-eminently a health resort, and the health resort of the West, and although "wealthy invalids from the East make up a good part of the population of the city," others besides invalids are settled here. Men of means from the East owning large herds

of cattle and sheep that roam over the great western plains from Montana to Mexico have found it best to make a home for themselves nearer their business interests, and seeking the best place have come to Colorado Springs. Others interested in the mineral wealth of the Rocky Mountains, especially in Colorado, Utah, and Old and New Mexico have also settled here.

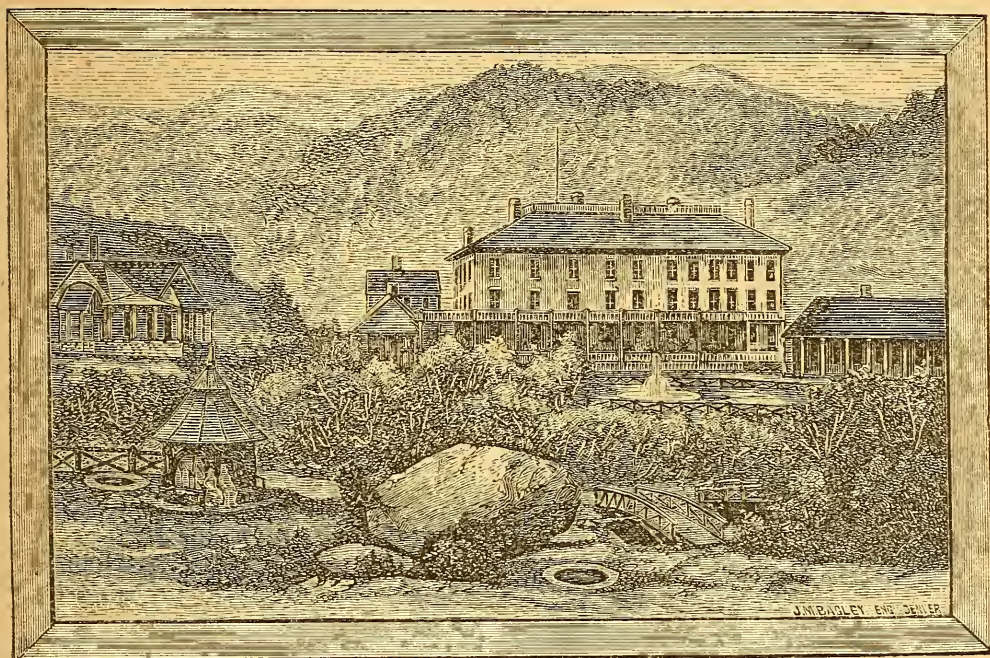
Unlike many of the towns and cities of the West, Colorado Springs is not cosmopolitan; it has scarcely any French, German or Irish element. The people are from the older states of the Union, and from Canada, England and Scotland; hence an entirely English speaking community. The people as a whole are probably better educated and possess more wealth than those of an eastern town of the same size. It is more New England-like in the general make-up of its social, religious and educational characteristics than any town west of the Mississippi. The poorer people are a respectable class who have received some social and educational advantages; none but enterprising or well-to-do people would ever cross the plains to establish a new home in the West.

There is much social life in Colorado Springs, for outside the amusements offered at the opera house, the people have to make their own society. This necessarily brings out the best social and mental qualities, and has given rise to social, literary and musical clubs and societies, and libraries and reading rooms.

Colorado College has a library of six thousand volumes of standard books, which has been contributed to by the public and is used as a public library.

There is a free reading room here under the charge of the Episcopal Church, and a flourishing Y. M. C. Association has rooms for the public.

The El Paso Club, an incorporated society, is a social club for gentlemen, having a suite of large and elegantly furnished rooms including two reading and writing rooms (in one smoking is not permitted), a large billiard room, card rooms and ante-rooms. This club has ample and excellent facilities for writing and correspondence, and has upon its tables all of the



CLIFF HOUSE, MANITOU.

first-class American, English and Scotch reviews and magazines, illustrated papers and the prominent dailies of the large eastern and western cities. This club is a great advantage to strangers who may be introduced by a member and enjoy its privileges for several weeks, and who may then become members by paying a monthly or annual fee.

Two daily and two weekly newspapers are published in Colorado Springs.

BUSINESS.

Colorado Springs is like a suburb of an eastern city; it is a place of residence having no local business except those

branches necessary to supply the wants of such a community and the surrounding settlements. Capitalists, however, can find ample opportunities for safe and profitable investments in the interests of Colorado, many of which are represented in this city.

It has three banks—one national and two private—each doing a good business. People in the West, even of small means, have their bank deposits and check books, and the banking business of a small town is much larger than in a town of the same size in the East.

Outside of the local business, the business of the banks is increased by the mining, stock and other interests represented by residents here. Large sheep ranches extend eastward from Colorado Springs making this place the principal centre of the sheep business of the state.

Colorado Springs and Manitou have every advantage for the healthful and beautiful residence of men having business interests in the states and territories of the great West or in the East. Several daily mails connect on the quickest trains with all parts of the East and West. Telegraphic communication can be had, any hour of the day or night, with the newest mining camp or the farthest city on the Pacific or Atlantic coasts. The banks here have correspondents in the principal mining towns and the important cities of the East, and drafts are drawn and cashed on reliable banks throughout the country.

Colorado Springs is centrally located in regard to the business points and the mining and grazing sections of the great New West. This city offers traveling facilities for reaching any point in the East and West equal to those offered by Denver or Pueblo; several trains a day connect with all north, south, east and west bound trains leaving those points, and many of the through trains pass through Colorado Springs.

The manner of living is modified by the climate, the accommodations of the place, and the health and circumstances of the individual. In Colorado Springs several hotels, and in Manitou four large hotels are open to guests, and in both places there are several first-class private boarding houses.

The Antlers, the new stone hotel near the centre of the town on the mountain side, and near the two railroad stations, is one of the finest buildings in the state. Peabody & Stearns of Boston and New York were the architects of this hotel and of Colorado College. Here may be found the very best of accommodations; and from every part of the hotel magnificent views of the city and its surroundings are obtained. A peculiarity and advantage which The Antlers possesses, not common to hotels in general, is its freedom from a *back yard* and back rooms; every room looks out upon mountains or plains and down into clean streets or pleasant gardens. It is fitted with every modern appliance for the convenience, comfort and safety of its guests, and is elegantly furnished.

The Manitou hotels are large and roomy, very pleasant, well furnished and well kept. But one of these hotels is open during the winter. The well filled houses and the same guests returning season after season testify to the popularity of the hotels and the town.

Furnished houses and furnished rooms, single and in suites in all parts of the town are ready for those who prefer home life to hotel life even for a short time. Many families who do not wish to take up the cares of housekeeping, hire furnished houses or rooms and "take their meals out;" this is a common practice and sometimes, more than half, perhaps, of the boarders in Colorado Springs do not room and board in the same house. There is no objection to this way of living as regards the weather, which is good the larger part of the year. In summer many sleep in tents, which is very pleasant in this dry

air and also considered very conducive to the health of those who come here to get the benefit of the climate.

The cost of living here will be of interest to those who find it necessary to give some attention to the economic features of life.

Completely furnished houses for housekeeping containing from three or four to eight or ten rooms can be rented for twenty to one hundred dollars a month, according to number of rooms, style of furnishing and location. Unfurnished houses of the same size rent for ten to forty dollars a month.

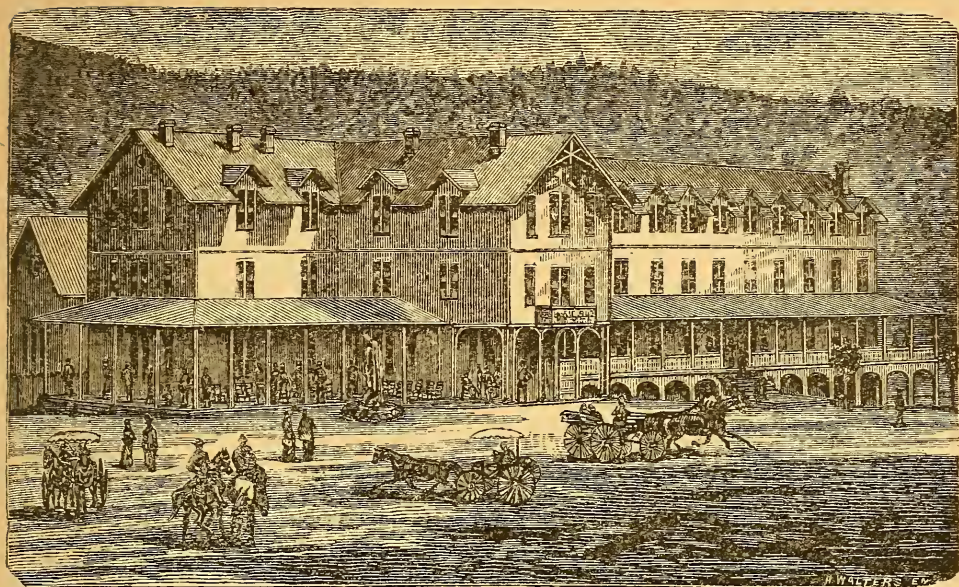
Small and plainly furnished rooms for one person rent for eight to twelve dollars; large and completely furnished rooms from fifteen to twenty-five dollars a month; this includes light and fuel.

Table board can be had for four and a half to ten dollars a week; *good* table board for six or seven dollars. At the restaurants board is from four and a half to six dollars a week.

The invalid coming for his health, needing the best living and accommodations, would usually find it advisable to pay from the average to the highest of these prices.

Life here is so much out of doors and in tents, that families can occupy a less number of rooms than they could in the East. The most economic way for a person who intends to reside here long is to build or buy his house instead of paying rent. Houses of all sizes can be bought or lots secured and new houses built at reasonable cost compared with eastern prices.

The expense of fuel is about the same here as in the East; the price of burning oil is twice as much, and gas is about one-third higher; provisions, groceries and dry goods are from 10 to 25 per cent. higher; flour is much cheaper, and the cost of supplying the table with meats and poultry is about the same. Domestic help is from twenty to thirty dollars a month.



. BEEBEE HOUSE, MANITOU.

A small family owning a house, doing the work and setting a plain but good table, can live at an expense not exceeding 15 per cent. above the price of living in similar circumstances in the eastern and middle states.

Our stores and markets are abundantly supplied with everything that is found in eastern markets except fresh fish; this is somewhat of a rarity and when in the market is expensive. Trout are occasionally brought in from the mountain brooks. Lake fish are brought from Chicago, and sometimes we have cod, mackerel and halibut packed in ice from the Atlantic coast and salmon from the Pacific. Through their season the best oysters come in bulk direct from Baltimore, and cost sixty and eighty cents per quart.

Western people learn to use canned goods of every description. The finest canned fruits and salmon from California cost the same here as in the East; canned meat and vegetables, including Boston baked beans for the Sunday morning breakfast for New England people, cost about twice as much. Fresh

vegetables are supplied by our fertile irrigated gardens; butter, eggs and milk come from the neighboring ranches; these things sell for a little more than in the East. In comparing these prices we mean by "the East" the middle, and the northern Atlantic states.

CLIMATE.

It is not the purpose of this article to encroach upon the subject matter properly belonging to a physician, but a few general remarks concerning the climate and its effects upon lung diseases will not be out of place.

The marked features of this climate are the dry atmosphere and clear sunlight for more than 300 days in the year.

This year in February and March for seven successive weeks, there were but five cloudy days, and during each of those five days the sun shone at times.

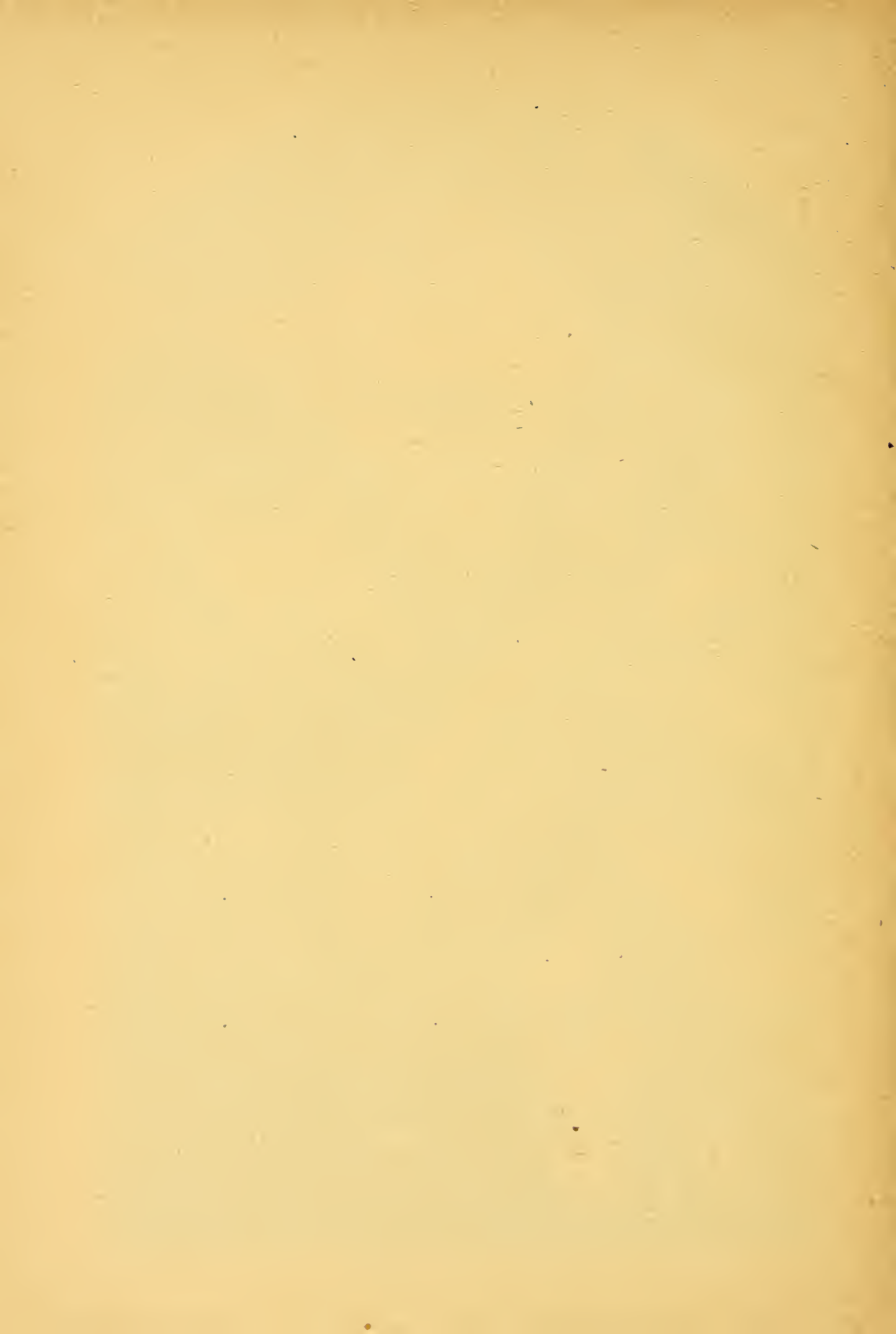
Most of our cloudy weather, with threatening snow or rain, is in April and May; the most disagreeable element of the climate is the wind storms in spring and fall, mostly in April and November. These dry storms of wind and dust, though unpleasant, are of short duration and not injurious to health.

Statistics might be given concerning the state of the weather from day to day throughout the year, but it is unnecessary here for they will be found in the weather reports accompanying this article.

Generally speaking there is no rain from the first of September till the next May or June, and often not much till July. July and August are the rainy months, and during this time rain is liable to fall nearly every day. Very seldom is there a long rain storm but tempests and heavy showers for an hour or two each day and usually in the afternoon. In the mountains snows are frequent and heavy in the winter, and the higher ranges have snow upon them nearly every month in the



WILLIAMS CAÑON.



year. But on the plains and in Colorado Springs and Manitou there is very little.

In the early part of the winter and usually in March and April, there are light snows which remain upon the ground only a short time, not longer than a day or two, and sometimes only a few hours. There is so little snow that cattle and sheep feed upon the plains through the winter with perhaps a few days exception, on the short buffalo grass which retains its nourishment in this dry climate like made hay which it really is.

The surface soil of Colorado Springs is a coarse, sandy loam into which the moisture sinks rapidly. It is never muddy here for more than a few hours, so that our streets and walks are practically hard and dry.

The temperature of this dry country is marked by sudden changes and extremes in summer and in winter. A noticeable feature is the decided difference between day and night, and sunlight and shade. Most of the days in winter one can sit out of doors in the sun, but even after our warmest days the nights are cold, especially towards morning when the mercury will frequently drop below zero. Owing to the absence of moisture the cold is not more noticeable here with the mercury at zero than when 15° or 20° above in damp localities farther east.

In summer when the sun shining through the clear, dry atmosphere is so hot, the evenings and nights are always cool and comfortable; also in mid-day it is cool and agreeable in the shade. On account of the absence of moisture in the air we never have any sultry or foggy days. Through the day the mercury seldom rises higher than 90° in the shade. But the heat is not oppressive as it is at this temperature in lower altitudes and damp climates. Such a climate cannot but be favorable to throat and lung diseases.

Probably the majority of the people of Colorado Springs and Manitou have made these places their homes on account of some pulmonary trouble. Many permanent residents, well and strong, engaging in active business here, in the mountains and on the plains, left the East with an almost hopeless disease of the lungs, and could not return to that damp climate without risk to their lives.

With hundreds of such examples of the effect of change and climate, Colorado Springs and Manitou have no need of weather reports or physicians certificates to establish the superiority of the climate in the cure and relief of lung troubles, asthma, malarial diseases and nervous prostration.

It must be understood, however, that this place is not a panacea, for there are heart and kidney troubles and some nervous affections that are not improved but aggravated by the high altitude.

Invalids coming to Colorado Springs and Manitou must leave all homesickness behind, and remember that they are not "out of the world," but they will find comfort, competent physicians, good society and good living here as well as "*at home.*" Those sick enough to need especial care should not come alone, but the moderately sick can soon find friends for themselves.

Invalids should remain long enough to see the effect of the climate, and they *must take good care of themselves*; climate—nature's remedy—works slowly but surely; climate will not remedy neglect of proper care in reference to clothing, exposure and living.

Warm clothing is absolutely necessary here, and flannels should be worn even in the warmest weather, especially by invalids, on account of the sudden changes, the coolness in the shade, and in the evenings. Invalids should have sunny and well ventilated rooms, but they should remember that the CLI-

MATE of *Colorado* as well as of other places is out of doors and not in the house, and they should remain in the warm sun and clear, bracing air as much as possible in order to receive its full benefit.

COMPARISONS.

The climate of the whole of the Great Western Plateau at the eastern base of the Rocky Mountains from Montana to Mexico, has about the same general features; and, as there are many pleasant and flourishing towns and cities in this region, let us see in what respects Colorado Springs and Manitou excel them as places of residence or as health resorts.

Towns higher in the mountains, though cooler in summer, have more storms, severer winters, and deep snows; places farther out on the plains are hotter in summer and more exposed and bleak in winter, and none of them have all the advantages for health and a place of residence possessed by Colorado Springs.

Denver, the "Rocky Mountain Metropolis," a large and beautiful city, lies 75 miles north, and Pueblo the chief manufacturing city of this region, 45 miles south, both cities several hundred feet lower than Colorado Springs. Denver, situated on the plains and 16 miles from the mountains, is colder, has more snow and severer storms in winter, and in summer is hotter than Colorado Springs and Manitou. Its social and educational advantages are probably unsurpassed, but its surroundings cannot compare with those of these two towns.

Pueblo lies in the valley of the Arkansas, and is warmer in winter than Colorado Springs and Manitou; the summers are excessively hot; its social advantages and its surroundings are not equal to those of Colorado Springs and Manitou.

The water of Denver and Pueblo pumped from the Platte and Arkansas Rivers, is muddy, and has to go through a settling or filtering process before it is fit to use, and then it is

strongly alkaline, having no comparison with the exceptionally pure water of Colorado Springs and Manitou.

The soil of Denver and Pueblo is adobe making the cities very dusty in dry weather, and after the least rain or snow fall, very muddy. In Colorado Springs and Manitou there is never any mud worth mentioning.

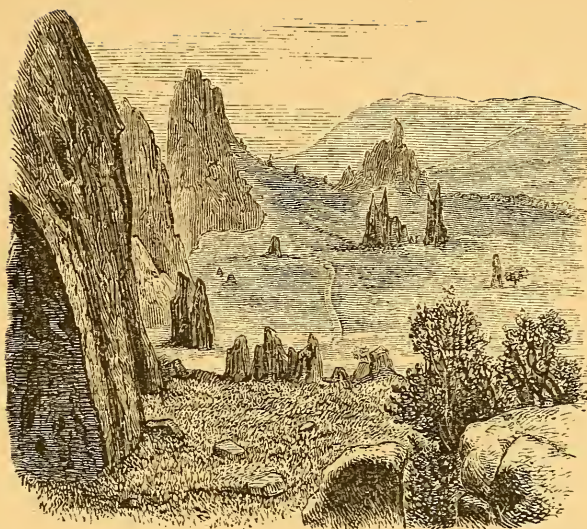
During the summer, the people of Denver and Pueblo help to swell the numbers that flock to Colorado Springs and Manitou to enjoy the climatic and scenic advantages of these places.

The Divide protects Colorado Springs from the cold winds of the north, and its nearness to the mountains is a protection from the severe sand storms that visit Denver and Pueblo.

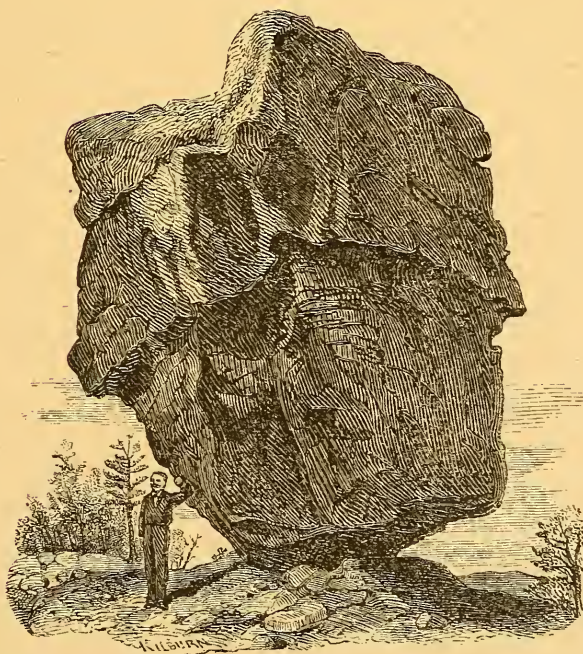
Las Vegas Hot Springs in New Mexico is a health resort which is being widely advertised, and it is not without its just claims. Its elevation is about that of Manitou, and its location is similar and very beautiful. But the likeness stops there; for all the beauty and interest of Las Vegas Hot Springs are gathered into that one spot, while at Manitou its numberless beauties and peculiarities extend in every direction. Its caves and cañons, its parks, its beautiful streams and springs, its Garden of the Gods, the summit of Pike's Peak, and its sublime mountain scenery have not their equal—so much variety within so small a compass—anywhere in the Rocky Mountains.

Santa Fe and other old Spanish towns in New Mexico in the Rio Grande valley possess no superiority in climatic features, and offer no such social advantages or comfortable accommodations for invalids, and favorable inducements and surroundings for pleasant homes as Colorado Springs and Manitou.

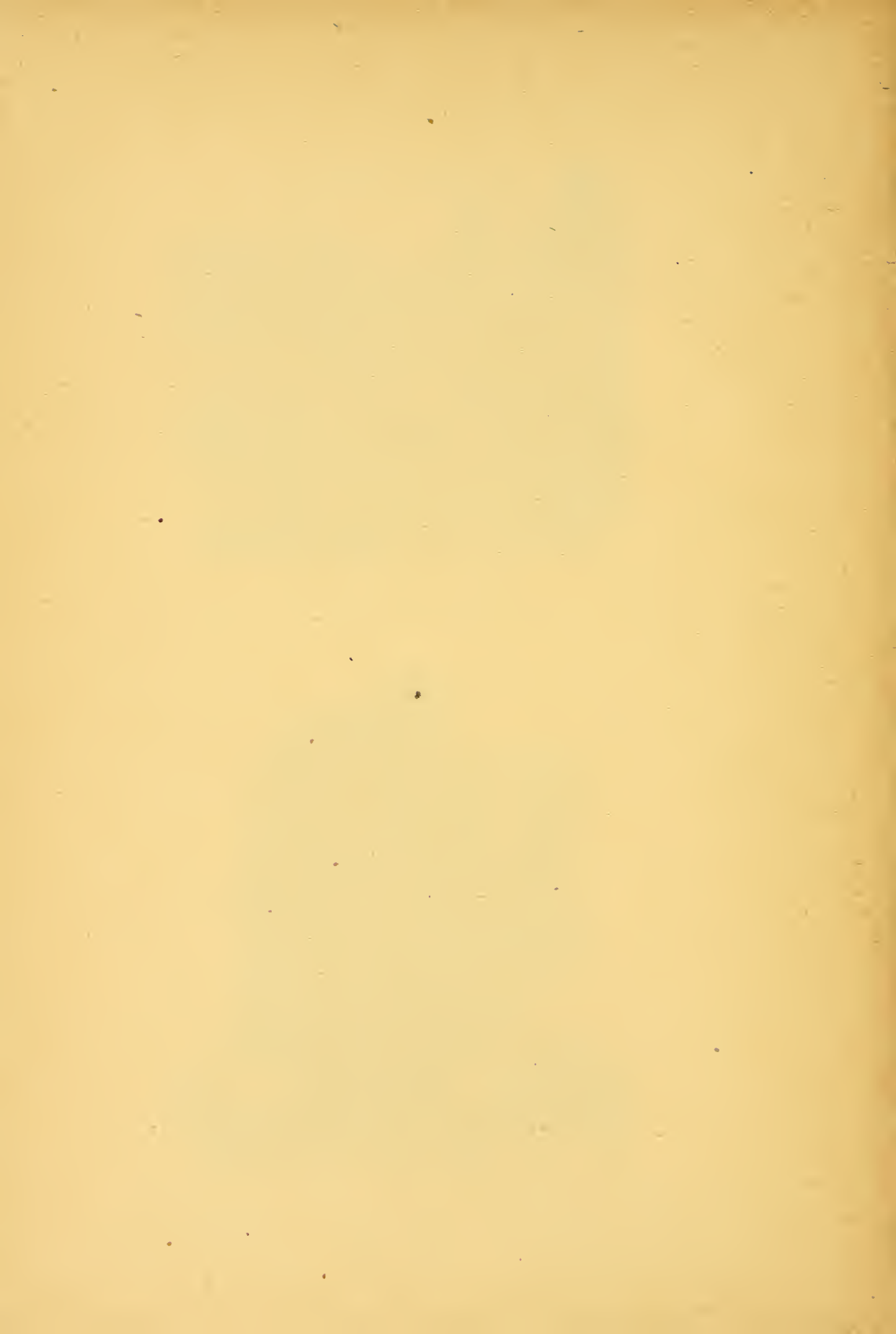
In Colorado Springs and Manitou are people who have tried the climate of the Southern States and California, receiving only temporary if any relief; but after a residence here



GARDEN OF THE GODS.



BALANCE ROCK, GARDEN OF THE GODS.



where the air is bracing and mild and without dampness, they have found permanent relief if not a perfect cure, and have made these places their homes.

After traveling over the western plains and through Colorado and New Mexico, with a member of my family whose case had been considered hopeless in Boston, the writer has no hesitation in saying that Colorado Springs far surpasses any other town in this great New West as a place of residence, and as a health resort.

Here, where perfect health has been restored by this excellent climate, in a New England civilization and surrounded by all the striking characteristics and peculiarities of mountains and plains we have made our home.

LOCATION AND TRAVELING FACILITIES

Colorado Springs and Manitou are on the parallel of the city of Washington and the extreme south of Italy, in longitude 105° west, near the centre of Colorado and at about the central point of the Great Western Plateau of the United States.

Colorado Springs is on the Denver and Rio Grande and the Denver and New Orleans railroads between Denver and Pueblo—75 miles south of the former and 45 miles north of the latter—and all trains connect with Manitou on a branch of the Denver and Rio Grande, five miles in length.

The approximate distances in miles from different points by rail, varied by routes taken, are as follows:

In Colorado, Leadville, 200; Gunnison, 215; Georgetown, 125; Silverton, 420; Durango, 375; Santa Fe, N. M., 400; El Paso del Norte, Mexico, 700; Salt Lake City, Utah, 700; Los Angeles, Cal., 1400; San Francisco, Cal., 1500; Cheyenne, Wy. T., 180; Helena, M. T., 1150; Kansas City, Pacific Junction and Omaha, the connecting points on the Missouri River with the great eastern lines, 650 to 700; St. Louis, 900;

Chicago, 1130 to 1230; Philadelphia, New York, Boston and the cities of the Atlantic and Gulf States, 2000 to 2500.

From California one can reach here by the northern or southern route. From any part of the United States east of the Missouri, all the principal railroads connect with Chicago or St. Louis, thence by different routes to Omaha, Pacific Junction or Kansas City on the Missouri, thence via Denver or Pueblo to Colorado Springs.



COLORADO COLLEGE.

At the general ticket offices, and at the principal railroad stations of the large eastern cities, through tickets can be bought for Colorado Springs and Manitou over the important lines connecting the main centres of the East and West. Baggage can also be checked through without rechecking. Through tickets can be bought and baggage checked from Colorado Springs to all principal points East and West.

From Boston, New York, Philadelphia or Baltimore, Pullman cars run through to Chicago and St. Louis, changing at these places for Kansas City, Pacific Junction, or Omaha. To Colorado Springs via Denver from Kansas City, Omaha or Pacific Junction, change is made at Denver. To Colorado Springs from Kansas City via Pueblo no change is made except during the winter months.

All the changes can be made in the depot at which you arrive, for a peculiarity of a western city, especially a railroad centre, is a union depot where all trains arrive and depart.

The main lines connecting Chicago with Omaha, Pacific Junction and Kansas City are the Chicago and Northwestern, the Chicago and Rock Island, the Chicago, Burlington and Quincy, and the Chicago and Alton. The principal roads between St. Louis and Kansas City are the Missouri and Pacific, the Wabash, St. Louis and Pacific, and the Chicago and Alton.

The four great lines running from the Missouri across the plains to the Rocky Mountains, are the Atchison, Topeka and Santa Fe from Kansas City to Pueblo and, except in the winter, direct to Colorado Springs; the Kansas Pacific from Kansas City to Denver; the Burlington and Missouri from Pacific Junction to Denver; the Union Pacific from Omaha to Denver.

All these lines are first-class in every particular, and every provision is made for the safety, convenience and comfort of the passengers; first-class meals are furnished in dining cars or at dining stations on the lines.

Colorado Springs is reached in three and one-half days from Boston, New York and Philadelphia, in two days from Chicago, and one day and a half from St. Louis.

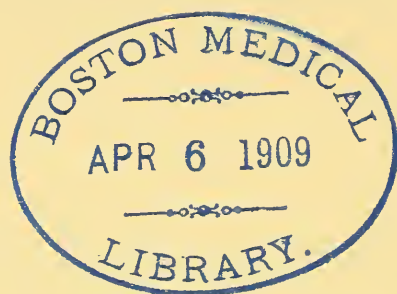
All necessary traveling information can be obtained at *reliable* ticket offices.

It will be seen that the traveling facilities enable people to come from their eastern homes to Colorado Springs with comfort and convenience, and even those who are unaccustomed to travel can, if not feeble enough to need care, come alone with ease and safety, making only two or three changes by stepping from one Pullman to another. Conductors and porters are courteous and attentive in giving information and looking after the needs of the passengers.

THE
HEALTH RESORTS
OF
COLORADO SPRINGS
AND
MANITOU.

BY
S. EDWIN SOLLY,

M. R. C.'S. Eng., L. S. A. Lond., etc.



PREFACE.

A committee appointed by our citizens having requested the County Medical Society to select one of their number to write an article, for general publication, upon the qualities of this locality as a health resort, the choice fell upon me, and the following pages have been written to comply with this request. The opinions therein expressed are set forth upon my individual responsibility and not as being the combined outcome of the views of the County Society at large. I am, however, indebted to my colleagues for several valuable suggestions and points of experience, but with respect to a subject so complicated as Climatic Influences the saw applies "Tot homines, tot sententiæ." Nine years ago I resigned the practice of medicine in England to try the influence of the Colorado climate upon my health, with satisfactory results, and the opinions and statements here advanced are founded upon my experience and observation as a practitioner of medicine in this locality for the last nine years. The article being limited did not permit the publication of clinical records or extended discussion of the many interesting problems referred to, but is put forward as an effort to assist physicians and their patients in answering the often recurring question of the wisdom of a change to Colorado, from some safe standpoint and not merely from hearsay reports unsupported by evidence or reasonable inference. Viewing this subject of Climate as resting upon a scientific basis and not alone upon empirical knowledge gained

in particular regions, I have followed the plan of first stating the facts and opinions that are generally known or accepted concerning the features and essentials of climates in general, and their influence upon the healthy body ; secondly, giving the general features of elevated climates and their effects both in health and disease, and finally, comparing these general effects with the special effects observed in this particular locality. Thus I have endeavored to show good reason for the faith that is in me, by connecting this fragmentary study of climate with the whole great subject of climatology.

S. EDWIN SOLLY.

*Colorado Springs,
Sept. 1st, 1883.*

CHAPTER I.

INTRODUCTORY.

Change of Climate.—More than two thousand years ago, Hippocrates, the father of the race of leeches, gave forth the dictum "That in chronic diseases, to change the locality was of much advantage," and that truth is evident to-day. Virgil wrote "The sky but not the spirit is changed of those who cross the sea,"—but this, from a medical standpoint at least, is not true, for it is often the change in spirit, or rather spirits, of the invalid which comes with change of scene, that is the immediate agent of the cure. Granting that the victim of chronic disease has sufficient margin of sound tissue and sufficient vital resiliency to stand the shock, the more extreme the climatic change, if in the right direction, the more decided the effect. And it is in the power the physician possesses of judging of this vital resiliency that the capacity for making the wisest choice of climate is shown.

Characteristics of the Individual.—As Dr. Julius Braun has said, in selecting a climate the character of the individual is a more important consideration than the character of the illness. Therein, I believe, is found the reason that many specialists of deserved eminence fail, not infrequently, to do justice to their clients, who are for the most part individuals whom they see only in short interviews and with whom they are but little acquainted; they are therefore compelled to form their opinions mainly from the local signs of their disease without knowing their general tendencies and habits. The invalid who takes his family physician with him to the specialist or who invites free consultation between them, affords him-

self the best opportunity of having the wisest choice of climate made for him. There are also two common errors which beset many of the physicians who send patients forth from their homes health seeking.

Medication.—The first is to fill their pockets with prescriptions for every imaginable symptom or circumstance that may arise, striving to direct in anticipation and from afar every detail of their case; and the second is, driving them forth with such cheery words as “oh! when you get out there you can throw physic to the dogs, and doctors, too; all you want is to breathe the fine air and you’ll be another man in three months.”

Absence from Friends.—There is also the error of letting those who are naturally, even in health, very dependent on their family, wander forth alone at a time when depressed health makes them feel the separation most. This is especially the case with married folk, for the normal married human being is, without its mate, as much out of its element as the classic illustration of a swan upon a turnpike road. The healthy mind of the beloved comrade is often needed to brace the invalid against the *bete noir* of homesickness, or keep alive his conscience on the subjects of cold-catching and diet. There are, of course, a certain number of invalids whose ailments are so slight, or whose will and discretion are so great, that they can stand alone without friends, physic or doctors. Horatio, Hamlet’s friend, who “took Fortune’s buffets and rewards with equal hand,” is a type of man who makes the best kind of patient to send traveling for his health. But such men are scarce and average humanity is, when sick, very dependent.

Medical Supervision.—Dr. Alfred Loomis, of New York, in discussing the merits of a particular health resort, remarked that he ascribed the advantages that the patients gained there largely to the excellent care that the resident physician took

of them. In some cases it is well for the patient to take the drugs himself, in others give them to the dogs, but in almost all cases an intelligent supervision by a physician acquainted with the climate is most advisable, for apart from danger run from lack of experience of the changed climatic conditions, there is the fact that in most chronic diseases, though there may be a speedy arrest or amelioration of the local symptoms, the constitutional faults which are the causes of the local disease take time to eradicate, and slight unfavorable occurrences may for some time give rise to renewed evolution of local signs, which though they may be less serious and of shorter duration than at home, yet nevertheless usually require some form of treatment.

Exercise.—One of the commonest errors that health seekers make is in matter of exercise. They usually carry it to excess. For instance this is a frequent experience here, for an invalid to call with a note of introduction from his home physician, saying that soon after coming he felt so well he did not think it necessary to present it, but now after some few weeks' residence he finds he is not nearly as well and came to see whether the altitude was not too great for him. Upon enquiry it is usually discovered that although previously but little accustomed to horseback exercise, he had been riding fast and far each day. By stopping most of their exercise for a time and then gradually increasing it such persons usually begin again to derive benefit from the climate. Remembering that the celebrated Doctor Parrish of Philadelphia is credited with having cured himself of consumption by driving round to his patients in a carriage without springs, our aim is in reasonable time to get our patients on horseback and keep them there for many of the daylight hours, yet the doctor with his advice "*festina lente*," should take precedence of the horse to save the invalid a hardly earned experience.

CHAPTER II.

GENERAL ESSENTIALS OF CLIMATE AND THEIR EFFECTS.

In stating the general points concerning climate I can not do better than draw mainly for the facts from the most complete and reliable treatise that has yet appeared upon the subject of climate cure, viz.: Dr. Hermann Weber's article in Ziemmsen's *Handbuch der Allegemeinen Therapie*, which contains the gist of what is generally known upon this subject. Dr. Weber writes that the character of the climate of a place depends essentially on—

- (1.) Its distance from the equator.
- (2.) Its elevation above the sea level.
- (3.) Its proximity, or the reverse, to the seas, or large inland waters.
- (4.) On the prevailing winds.
- (5.) On the nature and configuration of its soil, and its aspect with regard to the points of the compass.
- (6.) On the state of cultivation of its soil, its population and civilization.

The elements that make a climate are :

1. The air.
2. Temperature.
3. Humidity.
4. Light.
5. Density, pressure and weight of the atmosphere.
6. Electricity.
7. Configuration of ground.
8. Nature of soil and its products.

SECTION I—THE AIR.

The air is of these by far the most important factor, not only on account of its composition, but also as being the

bearer of nearly all the other climatic factors, and it is much the most important and indispensable sustainer of life.

Purity.—Angus Smith very justly points out that we make much more ado about a slight change in our drinking water than in our air, when we absorb a very small amount of the former and a very large amount of the latter, and it is undoubted that the modification and filtration of the water by cooking, by food and by the secretions of the digestive tract are much greater than that of the air by its passage through the respiratory passages, even in health; and in disease these natural safeguards act very imperfectly.

Oxygen and Carbonic Acid.—The relative amount of oxygen in a given weight of atmospheric air varies very little, being only a question of decimals; but bearing in mind the large amount of air breathed, and that the deficient oxygen is replaced by some other gas, commonly carbonic acid, a slight deficiency is often of great importance. In open spaces on the sea and on the mountains, the oxygen is increased and the carbonic acid diminished; in cities during wet and specially foggy weather, the carbonic acid is increased. The absorption of carbonic acid in large amounts is undoubtedly deleterious, but, as Dr. Weber remarks, in remaining for some time in a soot vapor bath, which contains more than 3 per cent. of the gas, no discomfort is felt, whereas in crowded rooms which contain only 1 per cent. nausea and headache are soon experienced; it is probably the other conditions which the decomposition of animal matter give rise to, beside the formation of carbonic acid, that are chiefly answerable for the symptoms of poisoning.

Ozone.—So far, little is known about it. Most chemists regard it as allotropic oxygen, containing three atoms of oxygen. The following points, however, may be considered as fairly established: That it is a powerful disinfectant, more

so than ordinary oxygen, though as one part of ozone in 700,000 of atmospheric air is about as much as is ever found, its direct action through the atmosphere must be insignificant. Ozone, however, is absent where injurious decomposition is going on, as in sick chambers, and is least in towns and greatest on the sea and mountains and under pine woods. The value of its presence would appear rather to be as evidence of the atmospheric purity than for its own quality as a disinfectant. It is increased by thunder storms and intense sunlight.

Dust, Germs, etc.—One of the chief reasons for the climatic benefits of sea and mountain air is the absence of poisonous or irritating substances floating in it.

SECTION II.—THE TEMPERATURE.

General Causes of Heat.—The cause of the warmth of the atmosphere and the earth's surface is mainly the sun which raises the temperature,—

- (a.) By its direct heat or radiation.
 - (b.) By indirect radiation, chiefly through the reflection from the earth,
 - (c.) By conduction from the earth.
 - (d.) By currents.
- (a.) Direct radiation conveys but little warmth, since the air is diathermanous to the sun's rays, letting them through it, and it is only by means of aqueous vapor that they part with any heat on the way, so that the damper the air the more it is heated by the sun.
- (b.) Indirect radiation or reflection, which is chiefly reflection from the earth's surface, is influenced by the nature of the solid and liquid surfaces; most of this heat is reflected back at once, the rest is retained for a longer or shorter time on the ground, then all, or at least a greater part is radiated back again into the atmosphere.

(c.) Conduction. The earth gives up a portion of the warmth which it has taken up to the layer of air in immediate contact, which rises and is replaced by a heavier and cooler layer, which in its turn rises and gives place to another, and so on, and thus a large amount of air is warmed.

(d.) Currents are the most important events in the aerial ocean, by which, changes called into existence at one place, are carried to distant spots. The heating of a layer of air by conduction and radiation, causes it to rise and the cold air comes in to take its place, giving rise to a current, which when marked is called a wind; by these currents heated air is carried from the equator to the poles.

General Causes of Cold.—To counteract this heating process, there are constant cooling influences at work—

(a.) Continual radiation of heat into space, whose temperature is very low.

(b.) A fluctuating amount of heat rendered latent by evaporation from the ground, waters and plants.

(c.) When the earth, which radiates quicker than the air, becomes cooler than the atmosphere, the latter gives up heat by radiation as well as by direct conduction.

Local Causes of Heat.—If the earth's surface was uniform in shape and quality and the amount of aqueous vapor in the atmosphere everywhere the same, one could calculate the temperature of a climate accurately by its latitude, that is its distance from the equator, but the qualifying influences of mountains, valleys, vegetation, soil and waters make this impossible, so that in a general way only can it be said that heat decreases with distance from the tropics. The difference between summer and winter also increases at the same time, because the sun's rays grow less perpendicular and the hours of sunlight shorter, as the distance from the equator grows more. The causes of increase of climatic temperature are numerous, as

by the gulf stream or other warm water currents, or warm air currents, as caused by winds from over warm seas or deserts, shelter from cold winds by chains of mountains, the neighborhood of a west coast, etc.

Local Causes of Cold.—The chief causes that lessen the temperature of a climate are elevation above sea-level, neighborhood of an east coast, high ranges, shutting off warm winds, wide seas between it and the equator, or absence of open water towards the poles, cloudy summers, and a clear sky in winter, cold currents, as the one which comes down the east coast of North America from the Arctic regions.

The mean annual temperature is of less importance to the physician than that of the various seasons, as the most different climates may have the same annual mean. It is further of "great importance to know the single temperatures during certain hours of single days, as it is only in this way that the physician can determine the average number of hours available of outdoor exercise by invalids."—(Weber).

The general effects of heat and cold upon the human organism are as follows: Cold causes more carbonic acid to be given off and more waste of substance, and under the influence of heat, less food is required; heat causes increased growth but lessened muscular power, as shown by Rattray's experiments upon the midshipmen, whereas cold has the opposite effect. The depressing effects of heat are much increased by dampness, as are the bracing effects of cold destroyed by the same cause. In a general way, it may be said, that heat promotes new growth and cold preserves it. As opposed to the common fear of cold, may be stated the fact, that, up to a certain point, mortality diminishes from the equator to the poles.

SECTION III—HUMIDITY.

Absolute Humidity is the absolute number of grains of vapor contained in a given quantity of air.

Relative Humidity is the amount contained relative to what it could contain, the standard maximum being 100 per cent. The lowest relative humidity according to Humboldt is 25 per cent.; under 55 per cent. is called very dry; moderate under 75; moderately damp under 85, over which very damp. Relative humidity is only valuable when the temperature is taken with it, as warm air takes up more vapor than cold.

Clouds have an important influence upon invalids, as depriving them of the advantage of the sun.

Rainfall is not synonymous with humidity, as very often the rainfall is very slight, yet the air is quite humid, as in southern California, for example, for if there are no cold currents, the vapor in the air will not be precipitated in the form of rain. The Swiss hygrometric observations show that precipitation increases with elevation, with exceptions, as in the valley of the Engadine, where the mountains give shelter from the north and west. But in North America, as a rule, the reverse is true. The general rule is that the rainfall diminishes with increased distance from the sea-coast. The amount of rainfall and number of rainy days by no means necessarily agree, as in some places where the rain is never moderate, there may fall in a few days more rain than is made up by a number of rainy days elsewhere. This point is of special importance as determining the number of days of out-door life for the invalid. Speaking broadly, the number of rainy days increases from the tropics to the poles, while the amount of rainfall diminishes. With elevation up to a certain height the number of rainy days increase, above which they decrease. Rain is not necessarily prejudicial to invalids; if not too frequent or excessive to prevent proper amount of exercise in open air, it has the advantage of purifying the atmosphere besides making it perhaps more vivifying by the formation of ozone and lessening of relative humidity, as people usually feel fresher and more active both during and after rain.

Snow.—The line of perpetual snow is lower going towards the poles, lower on the northern slopes of the mountains, and lower where the air is damp. Snow is not necessarily prejudicial to weak invalids; frequent melting is of course bad. But covering of the ground with snow is often attended with advantages, as it prevents the formation of spores; snow on a clay soil, however, is always bad for invalids.

Evaporation.—The evaporative power of the air of a place is important; it is variable, depending on the temperature, relative humidity, density and rate of motion of the air. It is greater when the air is warm and dry, and is increased by wind; is small when the air is still and near the point of saturation. It is most powerful in the summer, in the sun and wind, and only slight in winter, in shade and when the air is calm. It is most active at mid-day, and is almost absent during continued rain or clouds or calm. It is by this evaporative power or thirstiness that the air is kept continually supplied with moisture which is essential to organic life on the earth's surface. This humidity in the atmosphere, in checking the radiation from the earth by absorbing the heat and also by partly arresting the direct rays of the sun and thus regulating the light and heat, is a most powerful moderator of climate. It is the medium for the formation of dew, rain and snow, and is closely connected with ozone and electricity. The difference between sun and shade, and day and night, is very great in dry climates and seasons; on the other hand the rays of the sun may be obscured for days and weeks by too much moisture and the climate become depressing, both physically and mentally. This question of moisture is, on the whole, the most important factor in considering the therapeutic action of a given climate.

Action in Health and Disease.—The effects of damp air are so modified by temperature, pressure and wind that it is not possible to speak definitely of its action in these directions.

However there are many important points which are fairly established. The degree of absolute humidity, that is the actual amount of vapor in so many cubic inches of air is of consequence in breathing, since the air breathed from the lungs is not only warmed, but also saturated with moisture, exhaled from the tissues, and the amount of moisture lost by the breath must be limited by the amount of moisture already contained in the outside air, therefore the drier the atmosphere, the greater the loss of water by the lungs. As has been shown, cold air contains less vapor than warm, therefore there is also more loss of water by the lungs when the atmospheric air is cold, so in this way the relative humidity is of consequence. "A diminution of the secretion of the mucous membrane of the respiratory organs is a frequent result of living in dry air, a circumstance of considerable importance in treatment of chronic catarrhal and ulcerative conditions;" (Weber) and he further remarks upon the frequent value of loss of heat by the lungs when the air inspired is cold and when its dryness demands increased evaporation, which latter, it is well known is a most powerful agent in the reduction of heat. These points apply to the skin in the same way, small relative humidity increases the loss of water and salts by the skin by the laws of osmosis, that is the perspiration is increased, and if the air is very dry the perspiration is not perceptible upon the skin because the air so greedily takes up the water, this causes great evaporation, provided the air is warm; but the injurious effects of heat in this way, that is by increased evaporation, provides its own remedy and this is why in a dry climate hot weather is so much more endurable than in a damp one. The reason, again, that in a dry climate *cold* weather also is more endurable can be explained as follows: Dr. Weber writes, "heat is also lost by evaporation in cold weather when the air is dry, but the loss is not great, and can be very much limited by clothing, when there is not a strong wind at the same time.

On the other hand when the air is damp, the loss of heat from conduction is much greater than in dry air and is much increased by wind, so the damp air, when dew is falling, feels often colder than during frost, when it is dry, even though it may be 10° or 15° less cold." Let us further consider the functions of the skin for exhaling heat and moisture or for *inhaling* them, for the skin, being the damp, porous membrane necessary to produce the phenomena of osmosis, acts in both ways, and there is the effort at equalization and exchange that the law of osmosis implies. Thus when there is greater heat or cold or greater moisture or dryness outside the skin, the usual process is reversed; first, when the air is over blood heat we have the body heated up and all the results which ensue from high temperature, sun stroke, etc. Then with cold, if cold is absorbed by the skin faster than the heat-producing powers of the body can compensate for, we have, first, superficial paralysis and death, that is frostbite; then paralysis of internal and vital organs, from which stoppage results death of the whole system.

Increased Venosity.—With greater moisture outside the skin, we have distension of all the blood vessels, specially of course the veins, and consequently great sluggishness of circulation, and as the respiration is impeded by it and imperfect, the blood not getting thoroughly oxygenated, increased venosity, that is more than the proper proportion of venous blood in the circulation, ensues, and the weight of the body is increased by more water in the tissues.

Increased Arteriosity.—When, on the other hand, the air is dry, the body losing its moisture rapidly, the circulation is relieved and therefore hastened, consequently the blood receives oxygen more frequently and a state of increased arteriosity, to coin a word, that is an increased amount of arterial or oxygenated blood, is produced. This quickened circulation, by stimulating the various organs, produces greater waste of

tissue, specially destruction by oxidation of the fats, and the tissues are drained of their moisture. The nervous system participates in this general stimulation, specially from the more frequent supply of highly oxygenated blood to it, and the extreme results are loss of weight and fat, a too rapid waste and over stimulation of the nervous system and consequent rapid wearing out and incapacity for sustained exertion. The phlegmatic and corpulent Dutchman is Nature's type of increased venosity, and the spare, nervous Yankee the best specimen of increased arteriosity, climatically produced.

Modifying Influences of the Body.—This arbitrary separation of the effects upon the body of the elements of heat and cold, dampness and dryness in the atmosphere, is of course not absolutely true to nature, for one modifies the other, and above all there are modifications with which the human organism is specially provided to combat these extremes; as man's digestion is prepared to extract nourishment from all forms of food, so is his system prepared to extract what he needs of heat, moisture and oxygen, which three elements constitute his cutaneous and pulmonary food, from all forms of climate. Let us, therefore, briefly consider these modifications: when the air is hotter than the body, the absorption of heat by the skin is modified by the increased perspiration which gives rise to the cooling effects of evaporation, but to produce efficient evaporation the air must be sufficiently dry to take up rapidly the water of the perspiration, if it cannot, the body suffers the results of overheating.

Effects of Humidity with Heat.—It is common to suppose that sunstroke is caused solely by the hot sun, but this is not so; of course there must first be an atmosphere of a temperature sufficiently above blood-heat to give rise to mischief, but this granted, it is the extent to which the power of evaporation from the skin is checked that regulates the amount of damage done. This is very clearly shown by the fact that in a damp

climate where evaporation is limited, even with a much lower temperature, sunstroke is much more common than in a dry one. I have personally verified this by comparisons made on the spot in England, Egypt and Colorado. To produce the most complete amount of evaporation from the skin, granting a dry atmosphere, there must be complete relaxation of the cutaneous nerves. This is perhaps why the drinking of alcoholic beverages so markedly increases the dangers of sunstroke by producing an irregular action of them through its stultifying effects upon nerve centres, in some measure, perhaps, directly, and in some measure by its well-known property of checking elimination of waste products. Some observations were made in England a few years ago, comparing the amount and severity of cases of sunstroke among the harvest laborers in the districts where they drank cider in the fields and where they drank beer, and it was found that where the stronger liquor, beer, was taken there was more sunstroke.

Effects of Humidity with Cold.—When the temperature of the atmosphere is at freezing or lower, the absorption through the skin of the cold is qualified probably in this manner. As heat relaxes the cutaneous nerves so cold stimulates them, and the first effect of cold is to contract the fine muscles of the skin and close its pores, producing the appearance that is called goose-flesh, checking evaporation; second, the nerves which supply the blood vessels contract them so that the supply of blood to the skin is shut off, thus making it temporarily as little sensitive or able to be affected by outside influences as the nails or hair, further, the blood which is thus withdrawn from the skin goes to increase the general volume of the circulation, making it brisker and more vigorous about the heart and other vital organs and thus conveying the exhilarating sensations of cold. These are the effects produced when the cold is dry. When it is damp, as has been shown, the changes of temperature are so much less markedly felt that the nerves do

not respond as readily, the blood vessels are only slowly closed, and the blood dribbles, as it were, through the vessels of the skin, losing its heat and thus throwing cooled blood back on the lungs and heart and causing a general chill. The fact that damp air robs the nerves of their electric tension would be another reason why the nerves respond more tardily and imperfectly. These statements explain why in dry cold we feel our skins colder and our insides warmer, while in damp cold we do not feel our skin especially cold, but as if the cold was inside creating a thorough draft through our very marrow. Wind of course heightens these effects in both damp and dry air. Dr. Weber writes "Dry air is better thought of than damp; heat and cold, as has been stated, are better borne in dry than damp air, but dry air combined with very low temperatures acts as an irritant to the mucous membranes of the organs of respiration and excites a disposition to inflammatory diseases, especially pneumonia, while damp air combined with cold disposes to catarrh and bronchitis, also rheumatic and gouty affections. Damp air combined with warmth, on the other hand, exercises a soothing influence on the mucous membrane, demands on the strength are diminished however by its long continued action, the appetite and functions of the organs of digestion and the nervous system are not infrequently depressed, a kind of relaxation and diminished power of resistance to certain noxious attacks from outside appears, such as a tendency to diarrhœa, as we have often observed not only in invalids to whom we have recommended such climates, but also, and still more often, in healthy people who have been given them as companions. The separation of water by the lungs and skin is diminished in great dampness, and more work devolves upon the kidneys, while their activity is less called upon when the air is dry and warm, and we must always pay great attention to this in affections of the kidneys." Clinical observation leads me to believe that not only are the

kidneys in disease relieved when the air is dry and warm, but also when it is dry and cold. Dr. Weber himself states truly that "as cold air contains less vapor than warm, therefore there is more loss of water by the lungs when the air is cold than warm;" and this may more than compensate for the lessened loss by the skin; further, the improvement in the general circulation caused by the cold must relieve the venous congestion of the kidneys and make the elimination more perfect and regular. Perhaps above all, for reasons already given, the fact that the risk of cold catching in cold dry air is much lessened may mainly serve to explain the good health I have observed in cases of Bright's disease even in windy weather when the air was dry and cold.

Humidity of the Soil.—"Dampness of the soil, which of course entails dampness of the lower layers of air, appears to be connected with the development of rheumatic affections and of phthisis, since drainage of the soil has in many cases been followed by a distinct diminution of mortality from phthisis. (Bowditch, Buchanan, Simon.) In this case also the lower organisms which are developed in damp may act as the means, and the cause of the increase of phthisis may not be due to damp alone." It has been previously pointed out how a reasonable amount of rain or snow may fall without ill effects and has certain purifying and vivifying advantages, but these advantages are very quickly modified prejudicially if the soil on which they fall retains the moisture, as then the after dampness produced has all the bad effects of dampness without the good ones, therefore in looking at the rain and snowfall of a particular locality the quality of the soil is a most important element for consideration by the physician.

Effects of Sudden Increase of Humidity.—To quote Dr. Weber again, "A sudden increase in the humidity of the air appears to cause a considerable modification of the functions of the body, just like a sudden increase of heat. The separa-

tion of moisture by the lungs and skin is diminished, so it must be increased through the kidneys and intestinal canal, increased flow of urine and diarrhœa not infrequently follow, (Stewart, Hirsch, Thomas, Rohden,) and if the superfluity of water is not got rid of in this way, the beginning of an increasing quantity of liquid in the blood vessels is felt, and to this circumstance Rohden ascribes the increase of hemorrhages from the lungs on a sudden increase of humidity of the air."

SECTION IV.—LIGHT.

The direct action of light apart from heat is difficult of investigation, however the experiments of Downes and Blunt show that light hinders the development of bacteria and other low organisms, though Tyndall's communication to the Royal society in 1878, gave evidence of this not being constant under light alone. Moleschott's experiments on frogs show that light increases oxidation. Sunlight is more intense of course in dry air and more prolonged in high latitudes in the summer and vice versa in the winter, and this point has to be considered in mountain valleys. Dr. Weber's clinical observations show that a want of sunlight produces the following symptoms: depression of spirits, lack of energy, and loss of appetite, disturbance of digestion, turbid urine and a kind of homesickness; he also has found an irregular type of intermittent fever occurring in servants and others who sleep or pass much time in rooms half under ground, where no ordinary malarial causes were present, even in one case enlargement of the spleen taking place, these cases being best treated by large doses of quinine and relapses prevented by enlarging the windows. My own experience in London leads me to believe the Doctor's explanation of these symptoms is correct.

SECTION V.—DENSITY, PRESSURE AND WEIGHT OF THE AIR.

The weight of the atmosphere at sea level is equal to a

column of mercury 760 to 761 m. m. in height, the weight varying:

- 1st, with the latitude,
- 2nd, with the altitude,
- 3rd, with the time of day and year and other influences.

According to Latitude.—The column of mercury is specially low near the equator, being about 75 m. m., because of the expansion of the air by heat, the lighter air rising and flowing away in the upper regions towards the poles. Leaving the equator the pressure rises till it is highest between latitudes 30° and 40° , being there about 763 m. m. to 764 m. m. This appears to be caused by the currents flowing to and from the equator and the poles, lying over one another. Farther towards the poles the pressure diminishes again, and is lowest between 60° and 70° n. latitude.

According to Altitude.—The pressure continuously diminishes with the height, because the column of air above an elevated place weighs less than that at the level of the sea. The lower layers of air are much heavier than the higher, so that the air at sea-level is 1.6 times as dense as at Potosi which is 4060 meters above it. In the same locality the variations are partly periodical and partly unperiodical or accidental.

The Periodical Variations, which occur daily, have two maxima and two minima, beginning at mid-day, and they take place usually in the northern hemisphere at the following times:—

- | | |
|------------------|--------------|
| 1st fall—minimum | 3 to 5 p. m. |
| 1st rise—maximum | 9 “ 11 p. m. |
| 2nd fall—minimum | 3 “ 5 a. m. |
| 2nd rise—maximum | 9 “ 11 a. m. |

The variation is greatest in the tropics, and greater in summer than winter. The periodical variation is also less at elevations than at sea level.

The Unperiodical Variations are much more striking. They are greater in cold than in hot weather, also in the higher latitudes than in the tropics.

Causes of Barometric Changes.—"The chief is the unequal and ever changing distribution of heat and connected with it is the second, the air's varying capacity for moisture. The air is rendered lighter by heating, it rises and disappears above, so that the pressure of the heated column of air is less, while that of the colder column of the same height is greater. By the currents, layers of streams of different temperatures are produced, then some are removed, so that continual variations take place. A small portion of the combined pressure of the aerial column does not consist of air but of the contained aqueous vapor; when a portion of the vapor is condensed, it assumes the form of globules, or is precipitated as rain or dew, so the column of air loses a corresponding portion of its weight. Winds also have considerable influence on the pressure of the air, according to the conditions of temperature and moisture which they bring with them" (Weber).

The Physiological Effects of Increased and Decreased Pressure being so bound up with the other conditions, heat, moisture, etc., are not easily determined.

Increased Pressure.—The experiments of Vivenot, Lange, Paum and G. von Liebig show that by an addition of half to two atmospheres, the lung capacity is increased, the number of inspirations and beats of the pulse are decreased, while the pulse becomes stronger, more oxygen is absorbed by the blood and more carbonic acid given off, and the appetite increased.

Decreased Pressure.—Most observations have been made in balloon and mountain ascents, and are difficult to separate from the effects of temperature, ozone, etc., and in mountain ascents the exertion used has a qualifying influence. Dr. Weber made some twenty-eight interesting observations upon

persons carried up a mountain in sedan chairs, whereby the ascent was devoid of exertion. Space will not permit me to give the details, but of them he writes "collecting the manifestations we find only moderate increase of frequency in pulse and breathing in those who were not invalids, at elevations of 1100 and 1500 meters, with a sensation of comfort and ease of movement, increased hunger and thirst, and diminished disposition to perspire. But a greater elevation, 3000 and 3300 meters, heightened the frequency of the pulse and breathing, in many cases, in individual cases, slight muscular exertion rendered the action of the heart irregular and extremely weak, while manifestations of weakness and symptoms of mountain sickness arose, which appeared to be caused by anæmia of the brain, and were made better by stimulants and rest in a horizontal position. In not a few cases of tolerably strong individuals the activity of the brain appeared to be remarkable at a height of over 1500 meters, in rare cases to a disquieting degree; on which depends the frequent occurrence of sleeplessness to a greater or less extent, and it is also to be remarked that a smaller number of hours of sleep generally appears to be necessary at elevations than on plains or by the sea."

Tolerance of Alcohol.—Dr. Weber goes on to say that usually there is at elevations a great tolerance of alcoholic drinks, which he suggests may be accounted for by the rapid evaporation which occurs in rarified air. My own observations in Colorado at a height of 6000 feet and more lead me to the conclusion that most persons are more readily affected by alcohol, and require less to procure its effects, but that the effects are more transitory, and this agrees with what science teaches us, evaporation being more rapid in elevated places it necessarily follows that absorption is equally speedy. As a rule persons here state that they use and require less alcohol than in lower regions. I have further been led by personal observations and enquiry to believe there is much more toler-

ance of alcohol and more benefit and desire for it in a damp than in a dry climate. I have observed this by contrasts of England, Scotland, Egypt and Colorado, in individuals passing from one country to the other. The limits of this article will not permit further discussion of this topic, but it seems probable that the amount of humidity largely modifies the direct influence of altitude in special localities with regard to the influence of alcohol upon the system.

Balloon Ascents.—The experiences of Gay Lussac and Glaisher, Croce, Spinelli, Sivel, and others, all show that it is possible to remain at a height of 7600 meters without hemorrhage, that at 7000 meters rapid pulse, shortness of breath and blueness of skin is experienced, at 8000 meters difficulty in moving the limbs, and loss of consciousness on going higher and probable death from effusion of blood.

Great and Sudden Changes of Pressure.—The observations of Leyden, Lehwiss and others upon laborers who from working in mines and caissons under a pressure of two or three atmospheres suddenly return to a normal atmosphere, show as results, smarting in the ears and joints, giddiness and nausea and in some cases paralysis, from which most recovered, but in one fatal case curious furrows or rents were found in the spinal marrow.

Currents and Winds.—Their causes have already been explained, on the sea coast the usual daily sea and land breezes are accounted for in this manner: during the day the layers of air immediately covering the land become hotter than those over the sea. They rise into the upper air and flow away, and the heavier and colder layer over the sea comes in to take their place, thus producing the sea breeze, which is usually at its height in the early afternoon. After sunset the radiation from the earth being greater than that from the sea, the layer of air over the land becomes heavier and the sea layer being

lighter flows away and the breeze blows off the land to fill the void it tends to make.

Mountain and Valley Winds.—During the day the soil and lower walls of the valleys are strongly heated, consequently the lowest layers of air in the valley begin to rise along the mountain slopes and produce the morning wind, after sunset the peaks and upper slopes radiating more rapidly than the bottom and sides of the valley, the cold air descends with more or less force as the evening wind. In this way places higher up on the mountain sides are often warmer in the evening and night than those lower in the valley. This consideration is often of consequence as regards the value of a particular valley as a health resort, and further with respect to special houses or hotels in it. When there is a heavy rain or snowfall or melting snows these breezes being damp are apt to detract seriously from the otherwise good qualities of the resort. Dr. Weber writes as follows: "The winds are an important element in climatology, since they often quickly change the temperature, humidity and pressure of the atmosphere, and in a kind of way carry the climate of one place to another more or less distant; they have a great influence upon the purity of the air. It is not only the name East, West, or North which is to be looked to, but the character which winds from particular directions have for certain places at particular times of year. One must therefore know how frequently winds of a certain nature blow in a given health resort, how it is exposed or sheltered from them, or in what way they are modified by the configuration of the neighborhood. They withdraw more or less heat from the body and evaporate more or less moisture from the surface according to their temperature and humidity and speed, which varies between one and one hundred and twenty feet a second. Strong and cold winds are dangerous to lung invalids and the rheumatic and gouty, while moderate currents are beneficial, especially in warm weather. They act

in a more or less powerful manner, give the climate a stimulating character, taking the strength of the accommodation of the organism into account, and keep it exercised; but they demand a certain degree of strength of resistance."

SECTION VI.—ELECTRICITY.

The surface of the earth is charged with negative, and the atmosphere lying over it with positive, electricity. The positive electricity of the atmosphere is stronger at elevations, in the winter, and under a clear sky, as shown by the experiments of Becquerel and Breschot. The low temperature of mountain regions points to this, and perhaps also the sensation of increased energy which most men feel up to a certain elevation. Thunder storms appear to be more common in a middle zone (between 3,500 and 6,500 feet above sea level) than in higher or lower zones.

SECTION VII.—CONFIGURATION OF THE GROUND.

Over and above the modifying influences of altitude on the temperature, humidity and pressure, which we have considered, there are other influences as—

Plains.—When wide plains are dry, they get heated and cooled equally and when no side wind blows the cooled layer of air remains upon the ground and therefore the difference between day and night is very marked.

Mountain Ranges.—In all mountainous countries there is a fixed cloud region, where a portion of the moisture rising from below is condensed during the summer months. This layer of cloud, by diminishing sunshine and radiation, lessens extremes. The formation of clouds which arises from damp winds is different, the former blow along the slopes, but the latter rise and cover the peaks. The air is cooled by these winds by its coming into a colder region, and by its expansion from the diminution of pressure, and being cooled it precipitates most of its moisture in the form of rain, snow or mist,

and the wind that reaches the summit falls on the other side of the chain in a variously oblique direction, and not directly down the slope; it condenses on the way, becoming warmer in descending in the same way as it had become cooler on rising, also it becomes relatively drier, because warm air can hold more moisture. From this cause the lee side of the mountains is drier and more extreme in climate. Mountains often give a shelter from wind by diverting it, and may also diminish sunshine and give rise to other local conditions.

Elevated plains are often but little lower in mean temperature than those at sea level.

Valleys.—Their climate varies very much with the way in which they are sheltered from cold and damp winds and are open towards the sun, the sides during sunshine increase the heat by radiation and also diminish it at night. Therefore the extremes between day and night are more marked while those between summer and winter days are not. The question of how much the sides cut short the hours of sunshine is important. These extremes of temperatures when humidity is present give rise to mists and fogs in the valleys, while the upper slope may be in sunshine.

The aspect, that is the position towards the sun and wind, makes a great difference to a place, whether it lies on the sunny or shady side of a range. The sunny side in the northern hemisphere being the slope looking to the southeast or southwest. Besides the influence of the mountains upon winds as described there is also considerable effect from winds blowing over glaciers and snow-fields, bringing cold, and when melting, dampness.

SECTION VIII.—NATURE OF THE SOIL.

“The influences of the soil on the temperature and humidity of the lower layers of air are manifold, even when its inclination is the same; the amount of moisture which it ab-

sorbs, the speed with which it soaks in, the rate with which evaporation takes place, its capacity for heat, and the rate of heating and cooling, all change with the nature of the soil.”—(Weber.) The temperature is, for the most part, the same as the air. Professor James Elliot’s researches show that dry clay absorbs an equal weight of water, dry garden soil a little more than half, and dry sand only a little more than a third. Sand loses its moisture most quickly, and garden soil more so than clay. Sand heats more quickly and cools more rapidly.

CHAPTER III.

ELEVATED CLIMATES.

Dr. Weber divides climates into two groups—

1. Sea, island and coast climates.
2. Inland climates, which are subdivided into—
 - (a.) Elevated climates.
 - (b.) Low climates.

We will at once proceed to the consideration of the section about which we are mostly concerned, viz: Elevated climates.

SECTION I.—PHYSICAL PECULIARITIES.

The chief peculiarities of elevated climates, especially in Europe, are as follows:

1. *Rarefaction*, i. e. less pressure of the air.
2. *Coolness of Air*, but at the same time very great sun heat, which in winter far surpasses that of lower places, with-

out the air itself being sensibly heated by the hot rays of the sun. Low shade and very low night temperatures, especially in the cold months.

3. *Dryness of the Air* very marked, with a tolerably large rain fall.

4. *Movement of the Air*.—Strong winds in summer, less in winter and in high valleys which are sheltered and covered with snow.

5. *Aseptic Air*.—Very great freedom from inorganic and organic impurities and miasmas, especially during the period when the ground is covered with snow.

6. *Increased Light* with its influences.

7. *Increased Ozone* in proportion.

8. *Positive Electricity*, probably present in a higher degree.

9. *Dryness of Soil* usually existing.

SECTION II.—PHYSIOLOGICAL EFFECTS.

The physiological effects on invalids, Dr. Weber sums up in this way—

Skin.—Its activity is increased, and it is also better nourished and strengthened.

Circulation.—The heart and contractile vessels of the vascular system are probably strengthened; the frequency of the contraction of the heart is certainly increased at the beginning of the stay, but returns to the normal number after a time; each separate contraction is stronger, by which the strength of the circulation is increased.

Lungs' Respiration.—The number of respirations is increased at the beginning of the stay, but returns to the normal number after a time, and probably the depth of inspiration is increased. The respiratory muscles are strengthened and probably also the elastic vessels of the finest bronchial ramifications. The amount of blood in the lungs is increased.

Lungs' Excretion.—The amount of water separated from

the lungs is usually considerably increased and the separation of carbonic acid rendered easier.

Appetite and Assimilation.—A transient or permanent increase of appetite and assimilation of nourishment occurs in most cases.

Nourishment.—An improved formation of blood and nourishment of the organs consequently ensues.

Nervous and Muscular Systems.—There is a greater energy of both these systems.

Sleep is generally improved.

Change of Substance is probably increased.

SECTION III.—PATHOLOGICAL CONDITIONS.

Concerning the pathological conditions in high altitudes most is learnt from the works of Lombard, and on this subject the prize essay of Dr. Ludwig on the Upper Engadine is most valuable. He shows that at elevations there is an increased mortality in the following list of diseases, which are those most commonly known there :

Diseases Common.—Acute bronchitis, acute pneumonia and pleurisy, catarrh of the mucous membranes of the air and digestive passages and of the conjunctiva, rheumatic and neuralgic affections, also certain forms of anæmia and cardalgia which occur in women from unsuitable food and ways of living.

Diseases Rare.—It is rare to find cases arising there of chronic pneumonia, phthisis, hæmoptisis, scrofula, hæmorrhoids, intermittent fever, and similar diseases.

SECTION IV.—THERAPEUTIC APPLICATION.

The difference, writes Dr. Weber, in the action of the various elevated climates is very great, varying with their height, latitude, direction towards the points of the compass, configuration of the surrounding country, etc., only it may be said as

a rule that *the character of a mountain climate is stimulating on most functions, and that it has a powerful therapeutic action, but it requires a certain integrity and resisting power of the constitution to attain this favorable effect.*

Diseases Favorably Influenced.—A mountain climate acts favorably in the following conditions: loss of appetite and disturbance of the stomach from lack of exercise and pure air, with the consequences, as anæmia, chlorosis, etc. In chronic catarrh of the throat and bronchial tubes it assists the separation of mucus, the results of malarial poisoning, in sluggish circulation in the abdominal organs, hæmorrhoids, hypochondria; anæmic disturbances of nerve action, such as neuralgia, slight hysterical conditions, nervous polyuria. In most cases of nervous and bronchial asthma, which do not depend on emphysema and organic disease of the heart and blood vessels and are not complicated with them; sleeplessness from overwork or exhaustion without mental disturbance, weakness of the skin, a poorly developed chest; tendency to consumption and consumption itself; scrofulous diseases, though these are generally more especially benefited at the sea shore.

Diseases Unfavorably Influenced.—Most cases of organic disease of the heart and vessels, though a heart moderately enlarged, with a weak muscle, even with a bruit, is often improved, and generally much more so than on the coast; even cases of aneurism of the aorta are often relieved. A notable case is related by Archibald Smith at Jauja, Peru, 3,000 meters above the sea. Atheroma and senile affections are generally contraindicated. Chronic bronchitis with great enlargement of the tubes and much emphysema. Epilepsy made worse usually, though experience on this point is very limited. In lunacy where there is a tendency to agitation. It is also unsuitable for rheumatic affections. Much general debility, with inability to bear wind, cold, or change of temperature. Generally old age and infancy are also better on a warm sea shore.

Phthisis, though coming properly under the present section, is so important a subject and has so many ramifications, that it will be considered in a separate chapter.

CHAPTER IV.

GENERAL THERAPEUTIC APPLICATION OF ELEVATED CLIMATES TO PHTHISIS.

SECTION I.—GENERAL CONSTITUTIONAL CONDITIONS.

Upon this subject Dr. Weber remarks that we have not only to deal with changes in the lungs, but also with a want of something in the whole organism, and especially with innate or hereditary weakness of the nervous system, circulation, or digestion and powers of assimilation; often with habitual breathing of impure air or insufficient breathing from want of exercise and long continued depression of spirits; further, we must always keep the nature of the constitution before us, whether erethic or torpid, both in its mental or physical aspects.

SECTION II.—GENERAL TOPICAL CONDITIONS.

Apart from the special variety of the disease is the invariable presence of inflamed, irritated or purulent surfaces.

The essentials of the healing of such surfaces, if they were on the outside of the body, would be that the air having access to the wound should be pure and free from germs; so in the treatment of consumption, the first essential is pure air, whatever the view of the nature of tubercles, whether they are caused by the organic infection of spores or germs, whether every form of phthisis is complicated with them or not, or

whether phthisis arises from breathing air which has been already used; if we could treat the wounded surfaces or ulcers of the lungs directly, the treatment would be easier, although even Lister and other surgeons often find it difficult to disinfect a once infected wound.

The method of healing.—Apropos of this subject, Brandis of Aix-la-Chapelle said to Weber that wounds healed more rapidly the more fresh air was brought to them, and that drying and compression very much hastened the healing process. Now in high places more pure air is brought to the wounds by inhalation into the lungs, and as in the cool dry air more water and heat is given off by the breath, therefore we get the wounds dried, cooled and ventilated; further by the expansion of the air cells caused by the rarified air, the diseased surfaces are pressed together, therefore compression is also procured, and again the greater accession of oxygenated blood to the lungs ensures better nourishment which again is one of the means by the medium of good food the surgeon uses to assist healing. With respect to the drying process it is quite credible that this extends to morbid products already formed, that they lose water, the thicker pus dries up, and leaves the small masses of cheesy or chalk-like material, and the tendency to absorption of pus and consequent pyæmia, and miliary tuberculosis which is connected with this, is diminished. So far Dr. Weber's experience leads him to think these chalky concretions are frequently formed in those cases of consumption recovering in high altitudes.

SECTION III.—THE ZONE OF IMMUNITY.

It is undoubtedly true that there is much less phthisis on high ground than low, but there is no zone of immunity where consumption may not arise if hygiene is neglected. As shown by the occurrence of phthisis among Alpine goat herds and others who, leading a healthy life all day in an aseptic atmos

phere, shut themselves in little huts at night with closed doors and windows, foolishly dreading the pure dry air of night.

SECTION IV.—SUITABLE CONDITIONS.

The suitable conditions of phthisis for treatment in elevated climates are substantially stated by Dr. Weber to be as follows:

Predisposition to phthisis.

The various conditions under the names of acute catarrh, acute pneumonia and acute infiltration, with or without flattening of the upper part of the chest, arising from catarrhal, peribronchial or pneumonic affections, with several exceptions to be hereafter stated.

Pneumonia.—The after effects of pneumonia in the lower as well as upper lobes.

Bronchial Catarrh.—Chronic bronchial catarrh of the lower lobes unless accompanied with emphysema.

In these four groups the cure is often long and tedious and care has to be exercised for years.

Pleurisy.—Pleuritic exudations, which are not of a purulent nature, are easily absorbed, but the stay should be prolonged so as to allow the compressed lung to regain its elasticity, which the powerful inspiratory movements the rarified air gives rise to greatly aid in effecting.

Tubercles.—Deposits of cheesy tubercles if not too extensive are favorably influenced, though such cases after apparently being well for years may be suddenly hurried off by acute tuberculosis.

Cavities.—The presence of cavities does not prohibit the treatment in mountain climates, provided that there is enough sound lung left, the circulation and heat forming power are not too much injured, and the disease is not in rapid progress with continued fever.

Throat Catarrh.—Simple hoarseness from catarrhal swelling of vocal chords is favorably influenced, while cases of laryngeal phthisis are not suitable.

Night Sweats.—Copious night sweats are generally removed even when caused by incurable lung disease.

Fever which appears in connection with phthisical conditions is of too variable a nature to permit of the laying down of short, fundamental indications, and it can only be said generally that when it is of a pyæmic or septic character, or intermittent with periods of total or nearly total freedom, it is usually soon diminished and gradually overcome by a mountain climate with its accompanying dietetic and hygienic treatment, but if it is continuous, it points to rapid inflammatory conditions, and is rarely influenced favorably; but it must be clearly understood that no completely safe opinion can be given beforehand, since one often sees very favorable changes take place contrary to expectation when a mountain climate has not been advised; but experience allows us to lay down the rule, that those persons who become easily feverish with every cold, and show an elevation of temperature for days and weeks, even from errors of diet, excitement, or bodily exertion, are *erethic* and not fit cases for a mountain climate, even when the lung affection is quite inconsiderable; while those individuals who do not become feverish, even with extensive local affections, and rapidly lose the fever when fresh inflammations appear, have constitutions which are generally described as *torpid*, and get on well in a mountain climate.

The Circulatory Functions are nearly bound up with the degree of disposition to fever, an habitually weak and frequent pulse forms no decided indication by itself, but a high and lasting frequency of pulse on every slight cold, excitement, or moderate exertion shows a disposition to pyrexia and a constitution in which slight disturbances cause extended affections

which do not easily come to a standstill, and in which the harmony of the functions is easily disturbed and is regained with difficulty. On the other hand, individuals in whom the frequency of the pulse is usually moderate, and in whom it is only slightly increased by inflammatory complications, soon returning to the normal number, give a favorable prognosis for the influence of a mountain climate even when the local affections are extensive.

Hemorrhages.—The tendency to hemorrhages used to be universally considered as a contra-indication to a mountain climate, and is still assumed to be so by many, but the view which we have advocated in former communications, that hemorrhages are not only *not* more frequent in mountain cure places, but even rarer, is in accordance with the views of Spengler, Lombard, Williams, Unger, Ruedi, and is confirmed by the works of Solly and Denison in Colorado. We have notes on these points in the cases of sixty-two consumptive patients in high cure places and eighty-eight in lower places. The time of cure of the sixty-two patients in the mountain climate was nearly six hundred months, and of the eighty-eight nearly the same. Of the sixty-two patients, eleven had hemorrhages and sixteen occurred in the six hundred months; but of the eighty-eight, thirty-six had hemorrhages and sixty-two occurred in the whole time of nearly six hundred months; thus hemorrhages were four times as frequent low down as high up, and the cause of this is the less tendency to ulceration, septic conditions, and rapid decline on mountains, and it finds its analogy in the circumstance that, as Brandis of Aix-la-Chapelle tells us, hemorrhages were more frequent after operations, before the universal introduction of the antiseptic method, especially during the late war, than they have been since its introduction. In cases of tendency to hemorrhages, even without proved phthisical symptoms, we have frequently

recommended a long mountain cure, where no contra-indications were present, and with satisfactory results.

Diarrhœa, if not tuberculous, is usually favorably influenced.

Asthma, as a complication, is not excluded from a mountain climate, when the asthma is nervous or is connected with chronic bronchial catarrh, but emphysema, bronchial enlargement, and heart disease must be absent. We have met with several cases where a change to the mountains has caused rapid disappearance of the asthmatic complication.

SECTION V.—UNSUITABLE CONDITIONS.

Temperament.—Even in the first stage, erethic individuals who become feverish on the slightest cause, and have irritable hearts, an habitually quick pulse, with an inability to bear cold or the least change of temperature, can only use a mountain climate in exceptional cases and with the greatest care. Spengler, of Davos, states this strongly in his report on cure places for 1877.

Advanced Cases.—Invalids with advanced and still active phthisis in which both lungs are usually affected, are cases in which there is little hope anywhere, but they are generally more comfortable in warm, mild places, accessible to their friends, but if they earnestly desire to try a mountain climate the true state of things should be told them.

Hereditary Cases.—Ruedi, of Davos, objects very strongly to hereditary cases even with slight local signs seeking an altitude, but, as Weber says, they are unfavorable cases anywhere, therefore that alone need not bar them from trying the mountains.

SECTION VI.—EXERCISE.

Cases that are not able to be out of doors much, are not suited for winter residence at elevations. However, it is a

common error to suppose that in elevated cure places invalids can be rarely in the open air; on the contrary, it is exceptional for invalids, who have no fever, to be confined to the house in the Engadine, Davos, the Andes, and the Rocky Mountains, since even on the days when it rains and snows exercise in the open air is possible for some hours, in suitable clothing, since the air is particularly calm in winter and the number of fine days is one hundred and fifty and more in nearly all the cure places, and one hundred in the moderately good. The objection that invalids at elevations are more frequently confined to their rooms by colds, pleurisy, bronchitis, rheumatic fever, hemorrhages, and diarrhœa, Dr. Weber's experience shows to be an error. In forty patients in high cure places, they were confined to their rooms 7.3 per cent. of their stay, while in forty-eight patients in low warm places they were confined 19. per cent. He, however, attributes the unfavorable showing in the warm places, partly to the seductive pleasantness of the weather, leading the patients into imprudence, and also the indulgence in social relaxations without sufficient supervision.

SECTION VII.—STATISTICS OF CASES.

Dr. Weber says of seventy-five patients, who passed five months or more in mountain climates, eighteen were cured permanently or for a time, twenty-eight were made better, fourteen had no decided result, and in fifteen the disease made decided progress; of these, fifty were in the first stage, of which seventeen were cured; twenty-one decidedly improved; eleven doubtful, mostly growing worse, and one progressed steadily to death. There were eighteen in the second stage, of which one was cured, five got better, one had a doubtful and nine unfavorable results. In the third stage, with one or more cavities, there were seven cases, of which three got decidedly better, one remained doubtful, and three got worse.

Cure is meant to express cases in which the constitutional symptoms, such as the cough, etc. have disappeared for one or more years, and of local symptoms only the signs of healing to a scar remain.

SECTION VIII.—TIME OF STAY.

In cases of decided phthisical tendency even in the first stage, the treatment should extend over some years, though whether the whole or a portion of each year should be spent on the mountains depends much upon the character of the individual and the place.

That those cured of phthisis upon the mountains can never live again low down, is not the case; of course a cured consumptive will have to take care of himself for some years, and a return to the social and climatic conditions in which he got sick will always be dangerous, but this difficulty is usually much greater for those who have been cured in warm places than those who have been hardened by the mountains.

SECTION IX.—FURTHER TREATMENT.

Dr. Weber thinks though cold douches are often useful yet it is often of doubtful benefit at elevations, but cold rubbings are generally satisfactory. He agrees with Brehmer and his followers in insisting on frequent, suitable and nourishing food; he finds in the European mountains wine an important element of nourishment, from half to one bottle a day is given with benefit in many cases though there are frequent exceptions. Exercise in the open air should be encouraged as much as possible under the careful supervision of a physician, and for feeble cases, there should be opened and sheltered galleries, exposed to the sun. Every good cure place should possess level and gently rising walks with plenty of resting places, in winter with as much sun, and in summer with as much shade as possible. The near neighborhood of fir woods is also valuable.

CHAPTER V.

COLORADO SPRINGS.

We have now reviewed, as briefly as seemed practicable with obtaining a thorough comprehension of the chief outlines of the subject, what is known and believed by the most reliable authorities to be the essentials of a climate for therapeutic purposes, specially as regards the elements and qualities of a mountain health resort. We will therefore proceed to describe the qualities of the particular resort to be discussed.

SECTION I—SITUATION.

Colorado Springs is situated upon a plateau 6,023 feet above sea level, latitude 39° , longitude 105° . It is about five miles from the foothills in which the eastern slope of the Rocky Mountains terminates and from which the great plains stretch eight hundred miles east to the Missouri River, south to the Gulf of Mexico, and north to the Black Hills.

Colorado Springs cannot strictly be called a mountain health resort, for it is actually situated upon the first plateau of the great plains, but is surrounded on three sides by a semi-circle of hills. Immediately to the west is the great mountain of Pike's Peak, 8,000 feet above it and to the summit on an air line ten miles distant from this the shoulders spread, to the southwest terminating abruptly in a much smaller but very picturesque mountain named Chiann, while to the north they merge into a spur called the Divide, which melts away eastward into the rolling prairie, first throwing off, some four miles to the east, another spur, this breaking into the irregular shapes of bluffs curves towards the south, extending the shelter that the mountains on the west afford sufficiently to break the force of wind from the northeast, and leaving the

plateau open to the plains in its southern and southeasterly aspects.

The barriers from the wind and weather that this semicircle just described affords, being an average distance of four miles from the edge of the plateau upon which the town is spread, do not detract from its openness or free exposure to the sun. The Peak lying to the west robs it of the direct effect of the last beams in setting but gives a longer twilight than is usual on this continent. The value of this semicircle as a protection from storms is especially in the attraction it affords to the clouds that form upon the Peak, drawing the storms along its ridges to the northeast on one side or the southwest on the other, and thus frequently leaving the plateau free from the rain or snow that forms upon the mountains.

This distance of the hillsides, though it makes the shelter less complete than that which a mountain valley would give, obviates the objections that attach to a valley from the proximity of melting snow or falling rain upon its walls. Colorado Springs has in its five-mile-distant neighbor, Manitou, an exact example of the good and bad points of a mountain valley. In the foothills forming the western part of the semicircle are found in summer the cool retreats of cañons and in winter warm nooks upon the mountain sides among rocks and firs; to the north are the pine woods of the Divide, and to the northeast the warm and picturesque shelter of the bluffs, so that in summer or winter the health-seeking picnicker can find retreats of easy access in each direction to gratify his laudable desires. The plateau upon which the town is situated is a flat piece of ground of a somewhat triangular shape, having its base towards the north, with a small water course upon its western and eastern borders, which join at the southern extremity, forming the apex of the triangle. The town site begins from this point spreading to the eastern and western edges and extends about four miles to the north, the plateau itself

continuing some four miles further, where a water course running westwards cuts it off on the north and the bluffs bring it to a termination upon the northeast.

The surface of the town site is almost flat, but has a gradual slope to the south, standing from twenty to seventy feet above the water courses. Before the Colony Company laid out the town, now twelve years ago, nothing but the coarse grass of the prairies grew upon it, no trees or shrubs, and when wells were dug no water was found till after irrigating ditches were made, when water to a limited amount siped through.

SECTION II.—DRAINAGE AND WATER SUPPLY.

There is a top soil of about two feet, below which sand and gravel are found to an average depth of sixty feet, when a clay bed is struck which follows the slope of the surface and the fall of the watershed to the south. The soil, therefore, is naturally absolutely dry beyond what little moisture the top soil can hold to feed the grass, and with as perfect drainage as could be devised.

The drainage is into leaching pits which have ventilating pipes in them and in the connecting soil pipes. As no water is taken from the soil and the ground is extremely dry and porous, this system works without danger. The smaller and older houses however mostly have earth closets.

Irrigating ditches supply the lawns and trees with water, and are further supplemented by that which is conveyed in iron pipes for drinking and domestic purposes. This supply is brought a distance of seven miles from a pure mountain stream, taken at a point among the foothills, above all danger of contamination. The pressure is sufficient to throw the water above the highest houses without the need of fire engines and the amount of air bubbles confined in the water gives it a most refreshing taste, but a milky appearance when first drawn, which as the air escapes leaves it beautifully bright and

clear. The supply is ample so that baths and water closets can be well flushed.

SECTION III.—POPULATION AND DEATH RATE.

The town extends over four square miles, upon which the houses of the 6000 inhabitants are widely scattered. The residence lots are mostly 50x190 feet, and the streets and avenues vary from 80 to 125 feet in width. There are therefore none of the objections of a city in respect to overcrowding, and no manufactories or smelters to pollute the air. The death rate exclusive of death from consumption is only 5.6 per 1000; from zymotic diseases, 1.6 per 1000.

SECTION IV.—WALKS, ACCOMMODATIONS, AMUSEMENTS, ETC.

The gardens and streets are planted with numerous trees so that plenty of shade is afforded from the summer heat. There are parks with seats to rest the stranger; the ground being level, and the sidewalks firm and smooth, walking is easy for invalids. The country roads which diverge in each direction are good, and the prairie affords fine galloping ground for the equestrian. The livery is good and cheap. A handsome stone hotel named The Antlers was completed this summer at the cost of \$175,000, and is now running successfully under the management of a company; it has been built for the purpose of securing a hotel possessing large airy rooms, thoroughly good sanitary arrangements, freedom from noise and bustle, and as good a cuisine as the country markets will permit. Thus a home is afforded to invalids, and their friends, who are accustomed to luxury and comfort, and who wish to escape the responsibilities of housekeeping or residence in a boarding house. The house stands in four acres of pleasure grounds joining a public park, thus without the confinement of a city hotel, is only a block off the principal street. For those who do not enjoy hotel life even in this modified form there are many small but comfortable boarding houses,

or furnished villas can be rented by those to whom a home life is more attractive, and young men who prefer to live entirely in the country can find within a radius of a few miles farm houses affording good plain food and comfortable quarters.

There is an excellent college, good schools, and private teachers for those who have children to be educated, while for adults, attendance on one or more of the courses of lectures at the College offers the means of passing an hour or so a day in profitable and interesting study. Churches of all denominations are well supported. Two free reading rooms and a library are open to visitors, and an attractive club welcomes strangers with a good introduction at moderate fees.

A beautiful little theatre built by the munificence of some citizens, receives the best of the traveling dramatic talent, while there are two smaller halls open for the giving of balls and lighter entertainments. The town further possesses many tennis and croquet lawns, has also grounds for athletic sports and a fine track for horse racing.

SECTION V.—ACCESSIBILITY, VICINITY, ETC.

• Colorado Springs is upon the main line of the Denver & Rio Grande Railway, which follows the course of the eastern slope of the Rocky Mountains, sending branches westward through the mountains in all directions and eastward connecting with nearly all the trans-continental routes, being seventy-five miles south of Denver, where it joins the Union Pacific, and Chicago, Burlington & Quincy, and forty miles north of Pueblo, where it connects with the Atchison, Topeka & Santa Fe. It is less than four days' journey to either the Atlantic or Pacific coasts, while Europe can be reached in fourteen days. For invalids it is wiser, however, to prolong these periods by frequent stoppages. Access is easy from this point to other desirable places of about the same elevation, so that the invalid

can keep up the benefit that altitude affords and enjoy the pleasure and advantage of a change. Manitou, Denver, Pueblo, Cañon City, Las Vegas or Santa Fe can be easily reached in the winter, while during the summer numerous spots in the mountains, such as Manitou Park, Seven Lakes and the Divide are within a few hours' ride; or, going further afield, a change to the Twin Lakes, Wagon Wheel Gap, Idaho Springs and other places can be enjoyed. Besides these resorts, in all of which good accommodations can be found, the invalid who is fairly hardy can enjoy traveling among the mountains, camping, with the accompaniments of good hunting and fishing, or visiting the mining towns, while in the winter he can penetrate New Mexico and study the Pueblos and the Aztec civilization. In short, though Colorado Springs is, I believe, the best place upon the first arrival for the majority of invalids who are seriously affected, yet there is none of the sense of imprisonment attaching to residence here which there is to most of the winter resorts in the European mountains, where barriers of snow intervene between the visitors and the world at large.

CHAPTER VI.

WEATHER AT COLORADO SPRINGS.

The appended weather reports are for the most part the product of much intelligent labor by Professor F. H. Loud, acting on behalf of our college. They are, however, from necessity, fragmentary, and very inadequately exhibit the special peculiarities of the climate.

SECTION I.—WINTER.

Sunshine.—The reports fail to make credible the fact that for several hours on the majority of winter days, invalids can

sit on porches without extra wraps; so powerful is the sun's heat in winter that sunshades are grateful, and mid-day picnics are taken with enjoyment and benefit. It is at this season that the greatest improvement is noticed in the consumptives. On turning to the tables at the end of this chapter it will be seen that though the nights are often intensely cold, the days are seldom so. However, until we take thermometric observations, both in the sun and shade, and with continuous self-recording instruments, we cannot show what is the real temperature of the hours that especially concern the invalid. To a person unacquainted with physics or practically unversed in climates, the cold of the winter nights may seem a disadvantage; why this is but seldom the case is owing chiefly to the dryness as explained on page 63. The proportion of sunshiny days, as shown in table VIII, is more remarkable at this resort throughout the year, and especially during the fall and winter, than at any other from which reports could be obtained.

Snowfall.—The total amount of snow that falls through the whole winter is so slight that there are very few days upon which it is seen at all. The snow when it falls rarely lies more than a day or two, for the reasons that the dry air produces rapid evaporation and the dry soil quick absorption, so that it disappears without evidence of melting, and there is not the danger to the invalid of wet ground with a bright sun overhead.

Soil.—There are many places which, glancing at the weather reports, would appear to be as good, or better, than Colorado Springs with respect to winter temperature, sunshine and snowfall, which possess the serious drawback of a clay soil. Many of the older towns in Colorado, which were built for purposes of trade, are naturally in the river bottoms where the soil is clay and more or less saturated with moisture, and from which, when rain or snow has not recently fallen, an irri-

tating alkaline dust is apt to arise. Santa Fe, Cañon City and parts of Denver and Pueblo are places where these conditions more or less exist.

Sleighing is seldom possible, and only for a few hours at a time, in occasional winters.

Skating, however, is good on most days through the middle of every winter. The frosts at night make the ice so thick and hard that the hours of sunlight are not long enough to melt it to any appreciable extent, and the dry air absorbs the moisture from the melting ice so rapidly that a smooth, hard surface is usually presented for the skater's enjoyment.

The movement of the wind, as seen in table VI., will be found very interesting, and serve to explain how comparatively little the sum of the direction of the wind for the twenty-four hours exhibits the quality of the resort as regards the quarter from which the wind usually blows during the hours that the invalids are liable to be exposed.

The velocity of the winds, as exhibited in table IX., shows that though the air is constantly in motion, the winds are seldom such as to interfere with exercise, and it is from this constant changing of the atmosphere, as has been explained, that both at the sea and mountains the greatest benefits arise. Where any reasonable hopes can be entertained of recovery, it is undoubtedly true that for the majority of invalids, the old idea that a still atmosphere and equable temperature were desirable, is false. This table further shows that the velocity, as compared with other well-known places, is moderate.

SECTION II.—SPRING.

The spring is undoubtedly here, as elsewhere, the least desirable season of the year, but it compares favorably with other climates, and there is no period of melting snow or special month to be shunned, and an invalid can on occasion

change with advantage his location on the elevated ground of Colorado or New Mexico, for a few weeks, guided by the weather reports.

SECTION III.—SUMMER.

Temperature by Day.—In the shade the heat is seldom over 82° , as shown in table IV. The air being dry, as is explained on page 63, the heat is much less felt than a lower temperature in damper climates. But there being no solar temperature observations, the fact of the intense heat of the direct rays of the sun is not apparent.

Evaporation.—This heat is, of course, to some delicate invalids very trying, but as sun stroke is almost unknown, for the reasons given on page 65, if the head is protected harm is seldom done by exercising even during the hottest portions of the day.

The temperature by night is almost invariably cool, as seen by the temperature tables, and two blankets at least are grateful to sleep under; while the mornings and evenings being cool, without dew or dampness, give sufficient daylight hours for exercise for those who shun the mid-day heat.

The rainfall, which, with the melted snow, averages only fifteen inches for the year, occurs almost entirely between the middle of April and the middle of October, and falls chiefly in the three summer months.

Thunder storms, or rather showers, occurring in the afternoons and lasting about twenty minutes or half an hour, when much rain will fall at that one time, are the usual form in which the bulk of the precipitation occurs. These storms arise rapidly, are seldom preceded by the warning sense of discomfort that is usually felt in lower regions, and disappear as quickly, leaving a sense of refreshment after the heat, with few and rapidly evaporating signs of moisture upon the soil or

in the air. In turning to page 61, the points concerning rain, which are important to invalids, can be noted.

Humidity.—It is much to be regretted that no humidity observations, sufficiently complete to be reliable, have been taken, though the Denver average, as quoted, is probably very near what is the correct one for this district.

SECTION IV.—AUTUMN.

The autumn is perhaps the most enjoyable season of the year, it is very dry and warm, without heat and with few storms. Although there is no reason why patients suited to the climate should not begin their sojourn in any season that is otherwise convenient to them, yet perhaps September or October are on the whole best, because they then approach the cold nights of winter gradually.

SECTION V.—COMPARATIVE WEATHER.

Table VIII is compiled from signal service reports, for the tabulation of which I am mainly indebted to Dr. S. Fisk of Denver. The comparisons are made from places widely scattered and serve to show how when dryness and sunshine are the desideratum, they are found to a much greater extent in Colorado and New Mexico than elsewhere.

Table IX demonstrates what has been before remarked upon, that the winds are not excessively high in Colorado as is usually supposed.

Table X will be interesting to European physicians as exhibiting the fact that in winter, spring and fall the amount of sunshiny days is even greater at Colorado Springs than at Davos Platz, the most celebrated of Alpine resorts. The elevation above the sea level is nearly the same, but the timber line in Colorado is some two thousand feet higher. Compari-

sons between snowfall, humidity and temperature I was unable to obtain.

SECTION VI.—WEATHER REPORT.

COLORADO SPRINGS, June 30th, 1883.

DR. S. E. SOLLY,

DEAR SIR:—The appended tables, exhibiting some of the characteristics of the climate of this place, are drawn not only from the published records of the station of the U. S. Signal Service, maintained here from December, 1873, to July, 1876, but also from the work of all voluntary observers of whom I have been able to learn who have made connected series of weather-observations in the town, during its brief history of eleven years. When all the series are combined it is found that five of these years are recorded from January to December, and each of the other six in some part of its extent, but the record is unfortunately interrupted again and again, beside being made up of the work of different observers with different instruments, placed no doubt under different conditions of exposure. Yet the work of volunteers, since access can be had to the original record, supplies information more definite and particular, so far as it extends, than can be had from the published reports of the Signal Service station, and also covers a greater extent of time. For this work, aside from what has been done at the College, the chief credit is due to Messrs. E. S. Nettleton and Edward Copley, who observed from December, 1871, to December, 1873. Shorter series were taken by Mr. J. E. Follett and Rev. T. L. Fisher. All of these gentlemen placed their original notes, or a copy in full, in the library of Colorado College, to be incorporated with the college meteorological record.

In consequence of the interruption of observation, our information concerning the summer and autumn months is drawn from only about half the amount of material which is

available for the winter. The statistics at hand are also much more abundant for some of the meteorological elements than for others; thus the barometer observations are hardly in sufficient quantity to furnish a reliable table of the monthly change. The mean annual pressure for two years (omitting the reduction to sea level,) appears from the reports of the Chief Signal Officer to be 24,074 inches. At Denver, a series of eight years' extent is available, giving a mean of 24,774 inches. The elevation of the Denver barometer is 5,294 feet, nearly 800 feet less than of Colorado Springs. A reduction for this difference yields 24,064 inches for the mean pressure here, which accords well enough with the observations. In consequence of our elevation, the barometer is of course higher in summer than in winter, the air at lower altitudes being raised by expansion so as to bring a larger proportion of the weight of the atmosphere above our level.

The fullest statistics are those of the thermometer, the data at hand ranging from eight years' observations in the case of the months of January and February to five years' in that of August, September and October. The column of means for the whole day, in Table I, has been deduced from all this material.* The columns of means for 7, 2 and 9 o'clock con-

* In obtaining the mean temperature, a difficulty arises from the fact that daily means, as computed by the Signal Service, are derived from the so-called "telegraphic observations" taken three times each day, at the same instant of absolute time, over the whole country. In the local time of Colorado Springs the hours of these observations were 5:43 a.m., 2:43 p.m., and 9:08 p.m. The voluntary observations have mostly been taken at the hours of 7 a.m., 2 p.m., and 9 p.m. From the latter, daily means may be derived by the method in use by voluntary observers throughout the United States, viz: of adding twice the reading at nine o'clock to the other two readings and dividing the sum by four. It is obvious that daily means obtained by dividing the sum of the readings at the telegraphic observations by three will require a correction in order to be strictly comparable with those derived by so different a plan. This correction has been deduced approximately by means of the record of the year from April, 1878, to March, 1879, during which both sets of hours were kept at the College. It is

tain the averages of the observations taken at those hours, during five years for some months but only three for others. The column of means for 10:08 a. m. (Washington noon) consists of the monthly means for a single year, from April, 1878, to March, 1879. No corrections have been applied to these four columns, but it is proper to remark, in relation to the low temperature at 10:08 in December, that the December of 1878, when the observations at 10:08 were taken, was the coldest on record, the mean temperature of that month being $7^{\circ}.8$ below the mean of five Decembers. It is very probable that in a long series of years, the mean temperature at 10:08 would be found to be above 30° , both for December, and for the winter as a whole.

A place at the elevation of Colorado Springs cannot escape extreme temperature in winter; and in fact the record shows that in every year the thermometer falls once or more below zero, and sometimes a long way below. Table II shows the history of these extremes, and also exhibits the fact that though severe they are never either long continued or frequent. To indicate this, the lowest temperature of each month is placed, (in the second part of the table,) opposite the mean of the minimum temperatures of the several days; and

found that during that year the monthly means derived from the "telegraphic" and the "local" observations differed by the following quantities (taken in the sense Local minus Telegraphic): Jan., minus $0^{\circ}.8$; Feb., minus $0^{\circ}.3$; Mar., minus $0^{\circ}.5$; Apr., plus $0^{\circ}.9$; May, plus $1^{\circ}.4$; June, plus $1^{\circ}.4$; July, plus $1^{\circ}.0$; Aug., plus $0^{\circ}.7$; Sept., plus $0^{\circ}.6$; Oct., minus $0^{\circ}.1$; Nov., minus $0^{\circ}.5$; Dec., minus $0^{\circ}.6$. The yearly change shows thus a fair amount of regularity; but, to eliminate small irregularities, each monthly number has been averaged with the one preceding and the one following it, giving to the number belonging to the month itself *three times* the weight assigned to either of the others. Thus the following corrections have been obtained, which have been applied to the means derived from the telegraphic observations before combining them with the rest: Jan., minus $0^{\circ}.7$; Feb., minus $0^{\circ}.4$; Mar., minus $0^{\circ}.2$; Apr., plus $0^{\circ}.7$; May, plus $1^{\circ}.3$; June, plus $1^{\circ}.3$; July, plus $1^{\circ}.0$; Aug., plus $0^{\circ}.7$; Sept., plus $0^{\circ}.5$; Oct., 0; Nov., minus $0^{\circ}.3$; Dec., minus $0^{\circ}.6$.

the great difference between the two (especially when it is remembered that a number of nights of a temperature slightly above the mean is required to cancel the effect of one which is far below it) sufficiently proves the rarity of the extreme temperatures. On the other hand, the maximum temperatures of the winter and spring months, (as seen in the first part of the table) exhibit usually a less difference from the mean of the maxima of the several days, showing that the high temperature of the middle hours of the day, in those seasons, is more frequent than the excessive cold of nights.

During the summer months, as shown in Table III, the minimum temperature of the whole month differs (in general) very little from the mean of the minima of the separate nights of the month; and this circumstance (as well as the low figures found throughout the columns C and D) shows the constant coolness of our summer nights. Indeed, a warm night, even in the hottest part of the year, is of very rare occurrence.

The infrequency of temperatures near to the extremes, either of cold in winter or of heat in summer, is shown again in Table IV; which is drawn from the records of three years*. Here is given, for each of the cold months of the year, the mean temperature and the mean of the

* The "mean thermometers" of the table are obtained from those of the years 1872, '73, and '78-9, the "mean of minima," and "mean of maxima" from the years 1874, '75, and '78-9.

Before leaving the subject of extreme temperatures, it should be remarked that in 1883 the minimum thermometer, from the readings of which all the minimum temperatures of tables II, III, *since* 1878, are derived, was found to be subject to an error, slight for temperatures above zero, but increasing rapidly with falling temperature till at -26° the error amounted to 7° . The low temperatures since 1878 are, therefore, all represented in the table as lower than they actually were, to an extent which cannot now be determined. In the single instance of January, 1883, the true minimum temperature is known, and is inserted in the table in the place of the reading of the minimum thermometer, which was -32° .

minima of the several days, and, following these, the numbers to which these two means would be reduced by omitting the five coldest days of the same months. For the warm months, the mean of the maxima is substituted for that of the minima, and the last two columns are obtained by leaving out of the account the five *hottest* days.

But the readings of thermometers in the shade (and from such readings all the data of our tables are taken) entirely fail to exhibit adequately the true warmth of our winter days, unless compared with the indications of the blackened bulb, *in vacuo*, exposed to the sun's rays;—an instrument with which, it is to be regretted, only few and occasional observations have been made. They are sufficient, however, to establish the facts that, throughout the winter, sun temperatures of 110° and upward are quite usual, while 120° has been observed in January. In the summer months the sun-temperature generally ranges between 130° and 150° .

The power of the solar rays to heat in this manner solid bodies which are exposed to them, while the neighboring air remains comparatively cool, is a consequence of the low humidity of the atmosphere; to which is also due the fact that dews and hoar-frosts are comparatively rare, notwithstanding the coolness of the nights. Most of those who have taken notes of weather here have paid more or less attention to humidity; yet observations in sufficient number to determine accurately the mean amount of vapor present in the air, together with its changes of quantity in the course of the year, are unfortunately wanting; there is not at hand a series extending over even one complete and continuous year. What is on record, moreover, is derived entirely from readings of the dry and wet bulb thermometers, and these can by no means be considered direct observations of the humidity of

the air.* So far, however, as the observations go, they point to the conclusion that our climate in this respect will differ very little from that of Denver; where the mean weight of vapor present in a cubic foot of air (*absolute humidity*) is stated to be 1.81 grains, with a *relative humidity* of 45.8 per cent.; *i. e.*, the amount of vapor present constitutes on the average so many hundredths of the amount which would be required to saturate the air so as to cause deposition of the dew or frost.

When we turn to the allied subject of cloudiness and rain, we find no lack of observations. The amount of clouds has generally been indicated by summing up at the end of a month the number of clear, fair and cloudy days. In deciding to which of these classes a given day is to be referred, the rule laid down by the Signal Service is to estimate at each observation the extent (in tenths) of sky covered, and divide by the number of observations. If the result is three tenths or less, the day is clear; if eight tenths or more, it is cloudy; otherwise fair. The strict observance of this rule, which takes into account only the extent of cloud without regard to its density, has caused many a day in the winter to be recorded as fair which any one who used the terms in an unconventional sense would call clear, for the sky in that season is frequently more than half covered with a thin cirro-stratus cloud through which a star of the second magnitude can be seen with ease, and which hardly affects perceptibly the brilliancy of either sun or moon. On the other hand, owing to the tendency of the clouds to disperse at night-fall, a clear sky at 9 p. m. may occasionally be averaged with a very cloudy one at 7 a. m. and 2 p. m., and the result be recorded as a fair

* "The determination of the quantity of moisture in the air by means of the psychrometer of August, or the so-called wet and dry bulb thermometer, is found to be very unsatisfactory, because of both theoretical and practical difficulties."—*Report of Chief Signal Officer, 1881.*

day. Though the "fair" days are thus unfairly recruited at the expense of both the other classes, they entirely fail to equal the number of clear days, which are incontestably proved by the records to constitute here a majority of all the days of the year.

The rainfall has also been well observed, but an inspection of the results, as collected in Table V, well shows the need of a long series of observations to establish correct means for this, the most irregular of the meteorological elements. The remarkable contrast between the summers of 1874 and 1875 (both reported by the Signal Service office,) illustrates this irregularity. The average yearly rainfall comes out 15.87 inches. The frequency with which rain clouds are seen to move along the ridges of hills which encompass the town-site, as if deflected by them from the space within, suggests the probability that if the average rainfall of an area of five or six miles' radius around the town could be ascertained, it would prove the region in general to be much better watered than is indicated by the rainfall of the town itself.

The manner in which the comparative frequency of winds from the eight principal points of the compass is indicated in Table VI, will be seen to be modeled upon the tables annually published, for the stations occupied by the government's observers, in the Reports of the Chief Signal Office*. There are, however, two differences. The numbers entered on each horizontal line of Table VI are *percentages* of the whole number of wind-observation for the month in question, while in the tables of the Signal Service the actual number of ob-

* Such tables of wind direction at Colorado Springs will be found in the Reports for 1874-'5, 1875-'6, and 1876-'7. Table VI is entirely independent of these, being based upon the work of voluntary observers only. In the same Reports is given a detailed statement of the maximum and minimum temperature of the separate days for the time during which an observing station was maintained here.

servations of wind from each quarter is entered;—a method less applicable when the observations, as in the present case, extend over several years. In the second place, the three observations of the day are separated in Table VI, while in the Report of the Chief Signal Officer all the observations of the day are thrown together, thus obliterating the evidence, which appears on the surface in the present table, of the *diurnal* change in the course of the winds. It will be seen that while north and northwest winds prevail during the morning and evening, the middle of the day has oftenest a wind from the southeast.

The columns in Table IX, in relation to wind-velocity, will serve to show that this town is not subject to the continuous gales which are often imagined to prevail in the western part of our country. High winds are indeed not unknown here, but the highest on record, that of April 17th, 1878, only reached sixty miles per hour; and velocities exceeding forty miles per hour are rare. With any given velocity, the *force* of the wind is less here than at lower elevations, in proportion to the atmospheric pressure, which is one-fifth less than at the sea-level.

During a few months past a continuous register of the wind's direction and velocity has been kept at the College by means of self-recording anemoscope and anemometer. The record of the month of March, 1883, has furnished the material for Table VII, which may serve to illustrate, with greater precision than the mere counting of observations can give, that law of the diurnal change in the movement of the air to which reference has already been made. The mean *velocity* and *progress*,* (each in miles per hour) and the mean

* If a particle of matter, starting from the point of observation, should be borne upon the wind for an hour, (being subjected at every minute to a wind exactly similar, in direction and velocity, to that blowing at the same instant at the point of observation) its distance from that point at the end of the hour would

direction of the winds for this single month, are given for twelve periods of ten hours each, extending from midnight to midnight.

To state briefly in words the contents of the table, it appears that on an average day of last March, at sunrise, the mean direction of the wind differed but little from north, but with the advance of the day it swung rapidly around to the east, and reached this point by noon, or a little before. Still proceeding in the same direction of change, it blew from points further and further to the south of east until four o'clock, when its average direction was S. 52° E. It is at this part of the day that the greatest average velocity was attained, amounting, from 2 to 3 p. m., to twelve and a half miles per hour. After four o'clock, the wind slowly shifted back, and again blew directly from the east at a time averaging not far from eight in the evening. Thence until sunrise the mean direction worked gradually around to the north.

Speculations upon the causes of such a regular law of progress are interesting, but are not here in place. It remains only to say, in relation to the entire subject of our local climate, that notwithstanding the imperfection of the records, it is believed that each of the tables herewith submitted rests upon a sufficient amount of good observations to render it entirely trustworthy as an index of the particular element which it presents.

Respectfully,

F. H. LOUD.

be the progress, and its direction from the same point, the *mean direction*, of the wind for that hour. In obtaining mean progress from the register, the mean direction for each separate hour is first estimated, and by its aid the velocity as recorded by the anemometer is resolved into two components, one in the direction of the meridian and the other perpendicular to it. These components being separately added (algebraically) to those obtained in like manner for the corresponding hour of the other days of the month, the resultant of the two sums, each divided by the number of the days of the month, furnishes the mean progress and direction for that hour.

TABLE I.—Mean Temperature.

	At 7 a.m.	At 10:08 a.m.	At 2 p.m.	At 9 p.m.	*Day.
January	17.8	27.3	36.0	20.9	24.4
February	21.3	36.3	42.0	27.1	29.4
March	31.4	46.6	52.4	37.4	36.6
April	38.9	50.8	54.7	42.2	43.9
May	50.2	57.9	62.9	51.7	49.9
June	61.5	66.1	72.6	60.2	65.9
July	66.2	75.2	77.6	65.0	69.7
August	64.9	74.3	76.9	63.6	68.1
September	50.1	60.4	68.8	54.2	57.2
October	37.9	52.0	60.6	42.7	47.8
November	27.9	43.9	48.2	31.3	35.5
December	20.2	22.8	38.2	23.2	27.6
Spring	40.2	51.8	56.7	43.8	42.8
Summer	64.2	71.9	75.7	62.9	67.9
Autumn	38.6	52.1	59.2	42.7	47.1
Winter	19.8	28.8	38.7	28.7	27.1
Year	40.7	51.1	57.6	43.3	46.4

*The daily mean is one-fourth the sum of the readings at 7 a.m., at 2 p.m., and double the reading at 9 p.m.

TABLE II.—Maximum and Minimum Temperatures in Winter and Spring.

PART I.—Maximum Temperatures.

	1873—'74		1874—'75		1875—'76		1877—'78		1878—'79		1879—'80		1880—'81		1882—'83	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
December	65.0	44.1	59.0	41.7	67.0	51.6	69.0	..	59.5	31.2	68.0	46.4	63.0	40.5	55.5	36.8
January..	63.0	46.6	60.0	35.1	62.0	45.5	59.5	..	68.0	37.6	61.0	39.1	60.0	47.6	62.0	..
February.	59.0	43.2	58.0	40.8	64.0	51.6	61.5	47.1	68.5	47.1	61.0	39.1	60.0	47.6	62.0	..
Winter	65.0	43.6	60.0	39.2	67.0	49.6	69.0	..	68.5	38.6	..	..	..	..	..	..
March ..	61.0	48.2	67.0	42.0	65.5	49.1	70.5	..	77.0	59.4	..	..	70.0	51.3	67.5	54.9
April ..	82.0	53.6	71.0	..	79.0	60.8	72.0	60.4	..	..	..	..	73.5	..	70.5	56.6
May ..	92.0	74.7	84.0	70.3	84.0	67.6	80.0	65.1	..	..	..	..	..	..	80.5	66.4
Spring.	..	58.8	..	..	..	59.2	..	..	..	..	..	..	..	..	..	59.3
June ..	101.0	85.6	91.0	82.2	93.0	77.2	84.0	71.5	..	..	..	..	..	..	90.5	76.5

NOTE.—Column A contains the highest temperature of the month or season; column B the mean of the highest temperatures of the several days.

PART II.—Minimum Temperatures.

	1873—'74		1874—'75		1875—'76		1877—'78		1878—'79		1879—'80		1881—'82		1882—'83	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
December	-9.0	10.6	-4.0	15.1	3.0	21.2	-2.0	..	-15.5	5.6	..	..	..	..	..	..
January.	-15.0	14.6	-25.0	3.2	-3.0	12.3	-5.0	..	-18.0	6.5	-15.1	16.1	-14.0	11.3	-25.0	6.8
February.	-17.0	11.6	-8.0	16.1	-1.0	18.8	7.0	19.6	-9.5	19.8	-20.5	9.9	3.0	17.3	-20.0	4.7
Winter	-17.0	11.9	-25.0	11.5	-3.0	17.4	-5.0	..	-18.0	10.6	-20.5	..	-14.0	..	-25.0	..
March ..	1.0	19.8	-4.0	16.8	3.0	18.4	13.5	..	12.0	28.6	..	..	-9.0	24.0	6.0	24.2
April ..	5.0	23.5	6.0	27.9	7.5	30.9	20.0	33.8	..	..	..	..	15.0	..	19.0	31.0
May ..	27.0	41.7	26.0	42.0	26.0	40.4	30.0	40.5	..	..	..	..	..	..	26.0	38.4
Spring.	..	28.3	..	28.9	..	29.9	..	..	..	..	..	..	..	..	..	31.2
June ..	39.0	50.7	32.0	49.7	37.0	46.7	42.0	49.0	..	..	..	..	..	..	33.0	46.9

NOTE.—Column C contains the lowest temperature of the month or season; column D the mean of the lowest temperatures of the several days.

TABLE III.—Maximum and Minimum Temperatures in Summer and Autumn.

	1874.				1875.				1878			
	A	B	C	D	A	B	C	D	A	B	C	D
June . . .	101.0	85.6	39.0	50.7	91.0	82.2	32.0	49.7	84.0	71.5	42.0	49.0
July . . .	98.0	89.5	48.0	55.5	90.0	76.4	47.0	53.1	90.0	83.2	48.5	57.0
August . .	92.5	85.5	52.0	55.4	93.0	79.7	42.0	51.6	92.0	81.5	50.0	58.3
Summer	101.0	86.9	39.0	53.9	93.0	79.4	32.0	51.5	92.0	78.7	42.0	54.8
September.	87.0	71.0	27.0	42.4	88.0	73.7	27.0	44.9	82.0	69.9	33.5	43.0
October . .	76.0	63.1	20.0	38.6	82.0	68.7	18.0	35.9	79.0	61.7	13.0	32.1
November.	65.0	52.6	2.0	24.4	74.0	52.3	9.0	24.2	66.0	51.5	5.5	25.7
Autumn.		62.2		35.1		64.9		35.0		61.0		33.6

NOTE.—Column A contains the highest, and column C the lowest, temperature of the month or season; column B contains the mean of the highest, and column D the mean of the lowest, temperatures of the several days.

TABLE IV.—Effect upon the Monthly Means of the Omission of Five Days of Extreme Temperature.

	COLD MONTHS.					WARM MONTHS.			
	All the Days		All but Five.			All the Days		All but Five.	
	Mean Ther- mometer.	Mean of Minima.	Mean Ther mometer.	Mean of Minima.		Mean Ther- mometer.	Mean of Maxima	Mean Ther- mometer.	Mean of Maxima.
November . . .	35.9	24.7	38.8	27.6	May	54.1	70.1	51.9	67.8
December . . .	24.2	14.0	27.2	16.8	June	63.7	79.8	62.2	77.7
January	24.3	8.0	28.2	11.9	July	68.4	83.0	67.1	81.6
February	31.5	15.9	34.5	20.0	August	67.8	82.3	66.6	80.7
March	39.7	21.4	42.1	24.1	September	56.8	71.5	55.0	69.1

TABLE V.—Cloudiness and Rainfall.

	Average number of Days.			Mean monthly Rainfall	Total Rainfall.	
	Clear.	Fair	Cloudy.		Spring.	
January	19	9	3	0.17	1872	6.79
February	15	11	2	0.20	1873	2.91
March	15	12	4	0.68	1874	9.95
April	13	13	4	1.23	1875	2.45
May	11	13	7	2.65	1876	4.98
June	13	12	5	1.87	1879	4.39
July	14	14	3	3.65	1883	2.55
August	13	13	5	2.40	1872	10.81
September	20	8	2	1.78	1873	10.46
October	24	6	1	0.29	1874	1.92
November	19	8	3	0.52	1875	10.28
December	18	9	4	0.43	1878	8.24
Spring	39	38	15	1.52	1872-3	1.11
Summer	40	39	13	2.64	1873-4	3.10
Autumn	63	22	6	0.86	1874-5	4.86
Winter	52	29	9	0.27	1875-6	4.15
Year	194	128	43	1.32	1878-9	4.80

NOTE.—The "rainfall" includes melted snow.

TABLE VI.--Wind.

Proportionate Frequency of Winds from the Several Points of the Compass.

	AT 7 A. M.								AT 2 P. M.							
	N.	NW.	W.	SW.	S.	SE.	E.	NE.	N.	NW.	W.	SW.	S.	SE.	E.	NE.
January	44	31	11	2	0	3	4	5	25	18	4	1	8	31	9	4
February	42	26	6	1	3	4	3	15	20	9	12	8	12	27	6	6
March	36	20	7	2	2	9	4	20	5	9	15	7	18	37	4	5
April	32	26	8	9	3	10	4	8	14	13	14	11	15	26	2	5
May	38	17	3	2	13	15	6	6	10	14	7	9	25	28	3	4
June	33	17	1	8	11	11	7	12	10	8	0	5	18	47	6	6
July	36	40	2	0	4	10	2	6	7	10	7	11	13	32	13	7
August	45	21	4	0	8	9	0	13	12	28	5	3	13	22	10	7
September	38	41	1	3	0	6	0	11	4	14	4	10	8	45	7	8
October	55	28	3	1	4	1	4	4	6	6	5	6	24	39	13	1
November	55	28	5	2	2	5	2	1	21	12	6	4	11	34	10	2
December	48	33	7	1	3	3	3	2	20	14	7	3	13	39	2	2
Year	42	27	5	3	4	7	3	9	13	13	7	6	15	34	7	5

	AT 9 P. M.								Mean Velocity	
	N.	NW.	W.	SW.	S.	SE.	E.	NE.	Miles per Hr	
January	35	31	11	1	4	4	3	11	9.74	
February	22	22	18	3	2	12	4	17	10.30	
March	16	32	9	2	6	16	9	10	10.06	
April	30	20	9	8	7	10	7	9	11.69	
May	26	17	11	5	11	16	7	7	9.82	
June	21	30	10	3	7	17	5	7	8.33	
July	17	29	6	10	8	13	4	13	6.77	
August	32	36	9	0	3	12	3	5	6.37	
September	34	30	8	1	11	9	5	2	7.48	
October	40	33	5	5	2	9	3	3	7.31	
November	37	45	2	2	4	4	2	4	7.93	
December	39	32	9	3	1	13	3	0	7.10	
Year	29	30	9	4	5	11	5	7	8.58	

TABLE VII.

Mean Diurnal Variation of Wind, in Velocity and Direction, March, 1883.

TIME.	VELOCITY.	PROGRESS.	DIRECTION.
Midnight to 2 A. M.	8.7	6.1	N 17° 9' E
2 A. M. to 4 A. M.	8.5	5.8	N 11° 8' E
4 A. M. to 6 A. M.	9.6	7.7	N 11° 56' E
6 A. M. to 8 A. M.	8.4	6.8	N 6° 18' E
8 A. M. to 10 A. M.	6.9	3.9	N 24° 32' E
10 A. M. to 12 M.	10.4	4.6	N 79° 47' E
12 M. to 2 P. M.	12.5	6.1	S 61° 25' E
2 P. M. to 4 P. M.	12.5	6.4	S 52° 54' E
4 P. M. to 6 P. M.	11.3	4.9	S 60° 14' E
6 P. M. to 8 P. M.	6.6	2.6	S 69° 43' E
8 P. M. to 10 P. M.	7.6	2.4	N 62° 19' E
10 P. M. to Midnight.	8.2	3.3	N 46° 51' E

TABLE VIII.

	Elevation.	Barometer	Mean of 5 Years.			4 Years	10 Years.		Prevailing Winds.
	Feet.		Inchs	NUMBER OF DAYS.			Relative Humidity.	Yearly Rainfall.		Mean Temp'ture
		Clear.		Fair.	Cloudy				
Colorado Springs*	6050	24.06	194	128	43	....	15.87	46.4	N. and SE.†
Denver, Colo.	5294	24.77	177	142	46	45.8	14.77	49.1	S.
Santa Fe	7046	23.26	174	148	41	41.4	14.17	48.5	E. and SW.
Los Angeles	350	29.64	164	148	51	65.8	18.97	59.8	.....
Salt Lake	4348	25.60	141	131	93	40.3	17.52	51.8	NW. and SE.
Jacksonville, Fla.	43	30.03	126	152	87	69.0	55.94	69.2	.....
Augusta, Ga	183	30.14	123	150	92	69.2	48.98	64.2	.....
Newport	34	29.95	108	140	111	74.3	50.20	50.3	.....
Boston	142	29.84	105	145	115	68.5	49.47	48.5	W.
Chicago	661	29.31	104	154	107	69.2	35.47	49.3	SW.
St. Paul.	811	29.13	103	158	104	67.3	29.59	43.9	SE.
New York	164	29.85	101	155	109	70.2	42.70	51.3	NW.

*The data for Colorado Springs are taken from the preceding tables, and the number of years' observations from which each is obtained is stated in the letter which accompanies them.

†North at night; SE. in the middle of the day and the afternoon.

TABLE IX.--Comparative Velocity.

Total Annual Movement.

Year—April, 1873, to March, 1879.		Year—Jan. to Dec., 1880.	
Colorado Springs,	70,912	Newport, R. I.,	84,885
Year—Jan. to Dec., 1880.		San Francisco, Cal.,	82,724
Cape May, N. J.,	134,455	St. Paul, Minn.,	76,096
Milwaukee, Wis.	110,924	New York, N. Y.,	74,643
Philadelphia, Pa.	92,211	Chicago, Ill.,	74,192
St. Louis, Mo.,	90,927	Jacksonville, Fla.,	57,333
Boston, Mass.,	85,704	San Diego, Cal.	55,062

TABLE X.

DAVOS PLATZ.				COLORADO SPRINGS.			
	Clear.	Fair	Cloudy.		Clear.	Fair.	Cloudy.
October.	11	12	8	October	24	6	1
November	14	7	9	November.	19	8	3
December	16	8	7	December	18	9	4
January	19	9	3	January	19	9	3
February	16	8	5	February	15	11	2
March	18	7	6	March	15	12	4
Total,	94	51	38	Total,	110	55	17

The Davos observers divide the days into cloudless, constant sunshine, which I have grouped as coming under the head of clear in the Colorado observations. Clouds and sunshine, as fair; cloudy days, days when there were showers of rain or snow, wet or snowy days, all have been classed under cloudy days and compared. The Davos observations, which were all I could obtain, were for 1879-80-81, while the Colorado Springs figures are from several years' observations.

CHAPTER VII.

PHYSIOLOGICAL EFFECTS OBSERVED AT COLORADO SPRINGS.

On referring to Page 78 we find what are stated to be the physiological effects of elevated climates in general, and we will now discuss them severally in connection with what has been observed at this particular locality.

Skin.—"Its activity is increased; it is also better nourished and strengthened." These effects are very markedly shown, the ruddy appearance of residents indicates at once the activity of the circulation, and the quickness with which the nerves of the skin respond to the impression of cold and heat; whereby, as has been shown, nature protects the body against cold-catching, indicates its increased activity. These physiological effects are best demonstrated by a consideration of the influence of the climate upon the skin where there is some disorder or disease of it, or of some organ or function upon which it depends. As regards the skin itself, it is a common saying that Colorado is bad for good complexions and good for bad ones. This means that the beautiful pink and white complexion, that is so much admired, is destroyed, the burning of the sun and the vigor imparted to the circulation make fair maidens "ruddier than the cherry and browner than the berry." While the complexions of those who are sallow and marked with acne, are improved; the sluggishness and poverty of the skin is stimulated, the color gets brighter and the glands acting freely again the pores cease to be clogged with the hardened secretion, and by these means the acne is removed. For some time I thought I had effected many cures of acne with the use of sulphide of calcium, but I find that

the climate alone acts as well without drugs in average cases. Skin diseases of a chronic character are rare unless they are of a hyperæmic nature, occurring in full blooded or irritably constituted persons, while as might be expected in acute affections attended with fever, the symptoms are exaggerated; erysipelas, when it occurs, is more serious; in nettle-rash and most acute affections attended with itching the distress is increased. It appeared that in some cases of chronic eczema which recurred in the winter and in which cod-liver oil was beneficial, that the same treatment was more successful here than in the eastern climate, while a case of eczema which returned in the summer in a person of somewhat irritable habit was very intractable under the same treatment by which it had been readily subdued on the sea shore. With regard to the indirect effects of the improvement in the condition of the skin, much might be written; what has been quoted from Dr. Weber, at the bottom of page 67, about the relief afforded to the kidneys by a dry air, is especially true in Colorado, but will be further discussed in connection with kidney disease. Wounds undoubtedly heal over rapidly.

Circulation.—"Heart and blood-vessels are probably strengthened." The frequency of the pulse is certainly increased in individuals upon first arriving in Colorado, being greatest in those most feeble. In well persons and those who regain their health, it also soon returns to its customary number of beats. That each separate beat is made stronger is probable, but hard to demonstrate, however the fact will be admitted by all physicians practising in Colorado, that hearts which are muscularly weak, even when there are bruits, greatly improve in tone, strength and steadiness; while those where from some disease or obstruction the muscle is increased in size and strength, the symptoms are almost always so alarmingly developed that they have to be sent away before there is time to observe what the secondary effects might be. Further,

indirect evidence of this probable increase of force in each separate contraction of the heart, is to be found in what seems to be the fact that when bleeding occurs here, from whatever cause, more blood is lost in a given space of time, though it may afterwards be checked even more rapidly than was to be expected. The general circulation is undoubtedly more vigorous, and no doubt partly from this cause, though the increased oxygenation of the blood in the lungs and the improved circulation in the skin largely aid. The fact that the contractions are regular and not increased in number, and that there is no sluggishness of any of the bodily functions, explains what is undoubtedly true, that the circulation is not only strengthened but *equalized*, making the pressure generally more even. Experience in cases of aneurism gained here and on the Andes, as quoted on page 80, point very forcibly to this conclusion.

This equalizing of the circulation goes far to explain the relief of the chronic local pulmonary congestions which occur in phthisis and also the lessened tendency to hæmoptysis by relief of pressure on particular spots where the vessels are weak. Further, Dr. Weber and others have expressed their opinion, from clinical experience, that persons of erethic constitution do not do well at elevations. Now this means individuals with *naturally* irritable circulations, not those who being feeble in health are therefore easily thrown off their balance, and consequently in whom there is readily caused great temporary excitement and unsteadiness of circulation. This is precisely the experience gained in Colorado, and it is not unreasonable to suppose that beyond what the influence of the dry air upon the nerves controlling the blood-vessels may be, the stimulation and strengthening of the circulation by the climate tends to heighten this natural irritability. I believe I have seen persons possessing this temperament, but which was temporarily masked or modified by very depressed health, gain benefit until they have returned to their normal condi-

tion when their improvement ceased and they were then relieved by a change to a lower habitation.

Dr. Weber states, cases of atheroma and senile affections are contra-indicated, and this is our experience here, evidently for the reason that the increased force of the circulation caused by the climate cannot be accommodated, because the vessels have lost their elasticity and therefore rupture and extravasation may ensue.

Lungs' Respiration.—"The number of respirations is increased at the beginning of the stay, but returns to the normal number after a longer time, and probably the depth of the inspiration is also increased." This is in accordance with our observations. The greater expansion of the chest, and the frequency with which patients and others volunteer the statement that they can breathe deeper, confirms the opinion that the depth of respiration is increased; more bulk of air being taken in to give to the lungs an equivalent amount of oxygen, greater depth of breathing must needs follow. The increased chest development and the necessarily greater use of the respiratory muscles makes it tolerably certain that they are strengthened. That the elastic vessels of the finest bronchial tubes are also, is most probable, as where the air-cells and tubes are blocked with mucus, increased and easier expectoration ensues after coming here. All theory and fact tend to show that the amount of blood in the lungs is increased. The increase in the number of respirations works powerfully for good or harm in cases where there is a considerable portion of each lung into which the air is prevented by disease from entering the cells. When the obstruction is mainly from mucus and recent inflammatory exudations, the increased excretion of water from the lung membrane no doubt softens down the mucus and the more active respiration quickly procures its removal, so that in a very short time more air-cells

are made available, and instead of the common effect of shortness of breath being produced, the breathing becomes easier. On the other hand, when the obstruction to the entrance of air is of a more organized character, or there are considerable cavities, the breathing space being so limited, the increased number of inspirations taken is apt to produce congestion of the lung, such as is temporarily produced in overrunning or other violent exercise, and the shortness of breath is dangerously increased. In the first condition moderate exercise from the beginning helps to improve the breathing, in the second, almost absolute rest from even such exertions as dressing and washing afford the only chance of future relief arising from a stay at this elevation.

Lungs' Excretion.—"As a rule, *the amount of water separated from the lungs is considerably increased,*" and the separation of carbonic acid is rendered easier. This is, no doubt, the case in Colorado, though the evidence to be obtained is only indirect, and this evidence has already been put forward. There is, however, a matter in connection with the action of the kidneys that possibly deserves to be taken as additional evidence of this statement; that is, that it is quite common to find, especially on first arrival, an increased amount of solid matter in the urine, and more frequent inclination with less quantity passed. This condition will sometimes persist, though in healthy persons it generally disappears after a few weeks. This would indicate that more water is withdrawn in proportion by the lungs and skin, as the skin could hardly alone excrete the greater amount without giving rise to a noticeable excess of perspiration. That there is an absolutely greater amount of water excreted by the lungs and skin, if not by the kidneys, upon first coming to this altitude, is evidenced by the thirst and parched throat and dry lips usually complained of. Whether the fact that the normal weight of the body in healthy persons is generally decreased without loss of strength

or vigor, is to be accounted for at least in part by the body retaining persistently less water, is doubtful; when we bear in mind the natural tendency of the organism to quickly accommodate itself to altered circumstances. It seems more probable that an increased, more rapid, and perfect absorption of oxygen checks the storage of the hydro-carbons in the form of fat; also, the admitted increased excretion of carbonic acid would further assist in diminishing the formation of fat.

Appetite and Assimilation.—"In most cases there is a transient or permanent increase of appetite and assimilation of nourishment."

There is certainly direct evidence of the former to be found in Colorado, but as change of scene and air produce it almost everywhere, where the general conditions are not unfavorable to health, and notably so at the sea shore, and also on shipboard when the depressing effects of seasickness are absent or passed away, it is doubtful how far this may be taken as a special effect of altitude, except through the increased oxygenation produced by both sea and mountain air. It would appear that in those with whom Colorado agrees there is a greater consumption of meat, a good appetite, and probably an increased one. That there is also an increased assimilation of nourishment may be inferred from an increased appetite without dyspepsia, in fact the improvement that usually takes place in dyspeptic conditions, during residence in Colorado, is a good evidence of increased or, at least, more perfect assimilation.

Nourishment.—"From this follows an improved formation of blood and nourishment of the organs." The general vigor of the circulation with the ruddier color, which has been dwelt upon, would show that the improved quality of the blood must be due not only to the causes previously pointed

out, more oxygen absorbed, etc., but also to the more perfect conversion of food into blood; all this will likewise apply to the better nourishment of the organs which can be inferred from similar grounds.

Nervous and Muscular Systems.—"There is a greater energy of each of these." As primary effects these are strongly marked in Colorado, persons first coming here, with whom the climate tends to agree, usually feel exhilarated, frequently speaking of the air as champagne, depression of spirits vanish and they indulge in extravagant eulogies upon the scenery, etc., readily undertaking expeditions and tasks they would have previously shrunk from; their increased muscular energy also is evidenced by the feats of walking and riding they accomplish in the first few weeks, quite out of proportion to their previous efforts, and in spite of the greater expenditure of force demanded by the attenuated air. The reactionary lassitude that follows these exhibitions of increased nervous and muscular energy, however, is usually quite as marked. And this stimulation when yielded to freely, as it is most usually, is the great stumbling block at the entrance of the road to health.

These phenomena are of course most marked in invalids whom the climate suits, but whose health is below par. How far these effects are permanent is quite uncertain. In the case of invalids who are improving these signs would naturally continue. The popular impression is that in healthy persons continued residence rather lessens both nervous and muscular energy. I believe the truth, however, to be that tasks both mental and physical are more readily entered upon and carried out up to a certain point, but are wearied of more quickly. I do not think that, other things being equal, a man can sustain exertion, either nervous or muscular, so continuously; though the mind appears to be more than usually quick in

forming and expressing ideas, as shown in writing and conversation and in the schools, but there is little evidence of sustained literary work. As regards physical energy certainly great activity is shown by workmen, and a good deal is accomplished, which latter, however, may be partly due to the comparative absence of unfavorable weather or extremes of heat or cold, causing less interruption to continued labor. In the voluntary and unpaid exhibitors of muscular exertion as seen upon the tennis field or in the bowling alley, I think there is perhaps more energy displayed while the games continue, but the contests are less prolonged. With respect to the nervous system apart from its mental sphere which we have been considering, it would appear to be particularly perfect and alert in its functions; the quickness of the cutaneous impressions referred to, support this view. When pain is present as in neuralgia or rheumatism it would seem to be proportionally more acute, and in cases of chronic disease of the nervous system, where attacks of pain occur as in locomotor-ataxy, patients complain that the pain when it arises is sharper.

Sleep "is usually improved." This appears to be the case in Colorado in healthy persons, and in those invalids with whom the climate agrees; during their first few weeks of residence there is more or less tendency to nap, though between times they may be particularly wide awake. Later it would seem that less sleep is needed to sustain health, though it is especially profound. As regards the individual, the temperament probably largely influences this matter. The torpid generally are first made drowsy, and afterwards sleep well, the erethic or irritable are specially wakeful on arriving, and later their sleep is broken, exactly the reverse occurring on the sea shore. With respect to meteorological conditions, humidity undoubtedly is the first consideration, it being commonly observed that some sleep better in dry and some in rainy

weather; though an increase of elevation without marked change in the humidity will add to the tendency to sleep in the torpid, and the contrary in the erethic, thus indicating that altitude, that is lessened atmospheric pressure, has its own especial influence.

Change of substance "is probably increased." This is no doubt the case as consequent upon some of the climatic effects already set forth, particularly the increased oxygenation, and the increased excretion of waste products by the lungs and skin and probably increased excretion by the kidneys.

CHAPTER VIII.

PATHOLOGICAL CONDITIONS AT COLORADO SPRINGS.

Dr. Ludwig's enumeration of the pathological or diseased conditions most frequent and dangerous at elevations is to be found on page 19. We will compare it with our experience here.

SECTION I—DISEASES COMMON.

In Colorado Springs the diseases that a physician is most often required to treat among those of the residents who are usually in good health are, as in the Alps, as follows:

Various Conditions.—Acute bronchitis, acute pneumonia and pleurisy, acute catarrh of the nose, throat or windpipe, stomach and bowels, or of the conjunctiva of the eye, acute rheumatism and neuralgia.

Acute pneumonia is not infrequent; it seldom attacks the invalids, but more commonly persons engaged in outdoor work, and increases, other things being equal, with elevation, in both severity and frequency. The fever runs higher than at sea level in proportion to the amount of inflammation, and the crisis occurs earlier. The cases that pass the crisis usually recover rapidly without leaving mischief behind.

With regard to the certain forms of anæmia and cardal-

gia occurring in women from unsuitable food and ways of living, found in the Alps, I have not hitherto noted anything specially common or marked in type in this country.

Mountain Fever.—We have, however, what Dr. Ludwig has not noted as common in the Alps, a remittent fever, resembling typhoid, occurring mostly in the late summer and early autumn, called mountain fever. It is less frequent in the town than on ranches or in the mountains, its frequency and severity increasing with elevation. It more commonly attacks healthy and strong workers on farms, cattle and sheep ranches, or in mines, than invalids, tourists or citizens. It more closely resembles typhoid than any other fever, and perhaps the easiest explanation is to describe it as typhoid modified by climate. It is sharp and most dangerous in its outset, the crisis occurring early, after which recession is generally speedy, convalescence usually being complete in two or three weeks, but in the occasionally fatal cases the typhoid character is very marked, though it has seldom been permitted to verify the diagnosis by subsequent examination. Well developed, unquestioned cases of typhoid occur throughout Colorado apparently frequently arising *de novo*, without evidence of external filth poisoning. Mountain fever appears to differ from this, turning more in the direction of malarial fever of a very irregular character, but here again this fever arises without any evident malaria, unless possibly there may be, as has been suggested by Dr. Jesse Hawes, of Greeley, in the Colorado State Society reports for 1881, occasionally limited local areas where malarial poison is generated. Dr. B. P. Anderson, of this city, in his paper upon continued fevers in Colorado, published in the Colorado State Society's reports for 1882, has some interesting speculations concerning its causes and nature.

SECTION II—DISEASES RARE.

Chronic Pneumonia.—It is certainly rare to find chronic pneumonia established in Colorado.

Phthisis.—It would not be true to say that phthisis has never arisen in Colorado, for there are a few instances in which this seems to have occurred. The cases, however, of which I know have been in persons with hereditary predisposition, in whom, perhaps, the tubercles, though present, were not detected before coming, or who have contracted it from consumptives with profuse purulent expectoration, whom they have closely waited on. I have also heard of cases which had apparently originated on this elevated ground in persons who had lived under bad hygienic conditions, such as are referred to in section III, page 82.

Hæmoptysis.—I have not known of this occurring here except in consumptive visitors.

Scrofula is seldom seen except in the children of scrofulous parents, and when seen is generally mild in character and easily treated, and it is remarkable how few of the children who are born here to such parents exhibit scrofula or any allied disease, in fact the healthy character of Colorado children is proverbial.

Hæmorrhoids.—With respect to the infrequency of hæmorrhoids, it is difficult to judge what would be the average of these plagues to a given population, but it would appear as if it were as high in Colorado as elsewhere. When we consider how this disease is most largely dependent upon personal attention to the bowels and local conditions, this is not surprising, though theoretically the action of the climate is antagonistic to what is a chronic local congestion. Again, hæmorrhoids being largely controlled, even when they are not caused, by irregularities in the hepatic circulation, must be very much influenced by whether the liver acts well or ill in Colorado. Now in this respect persons may be mainly divided into, those who become bilious on first arriving at the sea shore, and those who do so on the mountains, noticeably on first arriving, therefore those who become bilious, in this

air, may be supposed to be more inclined to hæmorrhoids in this climate. This question of biliousness and locality is probably influenced more by humidity than any other climatic element, though temperature also undoubtedly exerts a powerful influence.

Intermittent fever is not known to arise in Colorado.

CHAPTER IX.

THERAPEUTIC APPLICATION OF THE CLIMATE OF COLORADO SPRINGS.

Dr. Weber writes "that as a rule the character of a mountain climate is stimulating on most functions, and that it has a powerful therapeutic action, but it requires a certain integrity and resisting power of the constitution to attain this favorable effect." This is quite true of Colorado Springs, and in considering the various physiological effects this stimulation has been dwelt upon. It is also undoubtedly the case that there must be enough margin of sound tissue, and sufficient amount of reserve force left in the constitution to react under the certain amount of shock that the climate induces, especially in feeble persons. This climate is undoubtedly active in its effects and not merely passively or negatively good as many climates are.

SECTION I.—GENERAL DISEASES.

Anæmia and Chlorosis are quickly benefited, though when the heart is extremely feeble or the nervous system easily agitated, over exertion or excitement will, on first coming, often result in a greater reaction and consequent depression than at home.

Results of Malarial Poisoning are here, as at like elevations, rapidly removed.

Acute Rheumatism occurs quite frequently in Colorado, is sharp in its attack, but is usually very amenable to treatment and seldom leaves enlarged joints or other results behind.

Chronic Rheumatism in the feeble is often relieved, but usually the sea air acts more certainly for good.

SECTION II.—DISEASES OF THE NERVOUS SYSTEM.

Lunacy, in which there is much mental excitement and agitation, a lower altitude is usually better, in chronic cases with little mental activity probably benefit is derived; melancholia and hypochondria, which are usually accompanied by a sluggish and feeble circulation, the climate tends to remove.

Hysteria, the result mainly of general debility, when care is taken at first usually improves, but the contrary is the case in hysterical persons of an erethic temperament or where the debility is so extreme that they cannot stand cold, wind or change of temperature.

Sleeplessness from overwork or exhaustion without mental disturbance is generally overcome.

Headache, when chronic, even when there is also numbness and pricking in one or more limbs, resembling commencing paralysis, when caused or accompanied by anæmia, without actual disease of nerve tissue, is apt to be removed. Patients affected in these ways are, however, liable to suffer temporarily more severely from their headaches or pains if they overdo themselves, but they rally more quickly; the interval between their attacks becomes more prolonged until the attacks cease altogether. Neuralgia, in the same way, when occurring in the debilitated, tends to rapid improvement, but in full blooded persons is liable to aggravation.

Chorea.—The symptoms are always aggravated, and most cases are better elsewhere, but the climate will, in suitable cases, remove the cause, and thus the attacks of the chorea will cease.

Paralysis.—Where the affection is acute the climate is unfavorable; when chronic and showing but little activity or progress, the other conditions being favorable, a residence here will sometimes improve the symptoms. This will apply to all forms of organic nervous disease. What conclusions I have previously published in a pamphlet on the influence of the climate upon the nervous system are, I believe, true, viz: "That cases of nervous exhaustion or anæmia are benefited here; that organic disease, when chronic, is not necessarily made worse, but when acute, decidedly aggravated; that disturbances of nervous equilibrium, when they occur, are more alarming, but not necessarily more frequent."

Epilepsy.—Dr. Weber states it is usually made worse, though evidence is very limited. Bearing in mind that epilepsy may arise from various causes, it would not be possible to lay down a law that the Colorado climate acted favorably or otherwise. My own clinical experience, which, however, is limited to a few cases, inclines me to the belief that if great care is exercised, epilepsy is somewhat benefited, and this is in accordance with theory. The immediate cause of epilepsy being a local irregularity of circulation, and often the remote cause, an irregularity of circulation in some other organ, the improvement and equalization of the general circulation that the climate induces would tend to relieve this; further, the improved nutrition and better working of the brain would lessen the chances of an attack; also as epilepsy is often caused partially by anæmia, or itself induces it, favorable results might often be expected. It is well known that any marked change of treatment is almost always followed by improvement in chronic epilepsy; it is therefore not remarkable that I have observed epileptics improve on first coming here. In one case, in which the attacks ceased for a year after coming and then an attack occurred, return to the lower ground again was followed by improvement for some months and then upon

threatenings of mischief, a return here again checked them. I would say, as regards advising the trial of this climate in epilepsy, that the other conditions not being unfavorable, it is wise to make one, special caution as regards exercise and excitement being taken; visits from time to time would probably be more beneficial than prolonged residence. The common experience of most physicians practising in this locality is, that epileptics become worse, and bearing in mind that in cases of long standing there is generally considerable irremediable structural change, and that the stimulating effect of the climate tends to exaggerate slight exciting causes, it is not surprising that the results should be unfavorable in most cases.

Asthma, when purely nervous, is almost invariably relieved, and sometimes cured permanently, though more often it reappears with a return to the atmosphere in which it was generated, the rest from attacks and improvement in the general health caused by the climate will, however, even then often ward off a relapse for some time. The elevation at which the greatest relief is afforded varies with the case. When there is much bronchitis and emphysema, or heart trouble, the asthma is often worse at first, though it may afterwards be relieved; where these complications exist their extent and character must be the guide about coming. When the affection of the heart is not very great or long existing, a relief of the asthma generally brings improvement in its tone. Where these complications exist, if a trial of this climate is advised, it is best for the patient to halt two or three times for a few days at least while ascending the slopes and avoid all exertion for the first few weeks after arrival, and be prepared to depart if improvement does not show itself at the end of the first month.

SECTION III.—DISEASES OF THE ABDOMINAL ORGANS.

Sluggish Circulation in the Abdominal Organs, Dr. Weber writes, is much relieved, and the same might be said of all the or-

gans of the body; it is notably true of the lungs. The spleen, when enlarged by malarial or other poisoning, without organic disease, shrinks in size. The liver, when chronically congested, without disease, is relieved; persons of sluggish circulation who are spoken of as bilious and having a torpid liver, undoubtedly improve here, while those of a quick nervous temperament who are liable to acute congestion with fever do not do well. Persons in whom attacks of gallstone occur appear to secure greater immunity by remaining in Colorado, probably by the improvement in the hepatic circulation. The improvement that is noticed in chronic albuminuria is no doubt largely due to the relief of the chronic congestion of the kidneys. The tendency of the climate to relieve sluggish circulation appears also to ensure greater regularity of the bowels in debilitated persons.

Liver.—Where there is actual acute or chronic disease of the organ, the climate is probably generally prejudicial; with regard to functional derangements the question of cause and temperament must decide as discussed under the head of biliousness.

Kidney Diseases.—Acute affections are doubtless more dangerous, but in chronic disease clinical observation as well as theory point to Colorado being decidedly beneficial. As I have dwelt elsewhere upon the theoretical grounds for the good effects of the climate, I will not repeat them. The analogy appears to be correct between kidney and lung disease, as acute pneumonia is not infrequent and generally severe, so is acute renal inflammation, and as chronic pneumonia is rare and apt to be relieved so is chronic kidney mischief. Some physicians think that albuminuria is specially frequent in the latter stages of phthisis. This is hard to prove, I am not inclined to think from clinical experience that it is, but as such albuminuria is usually of the lardaceous form and is caused by the absorption of pus from suppurating surfaces in

the lungs and not from primary irritation or inflammation of the organs themselves, it does not appear to affect the question of the climatic influence. Dickenson in his book upon albuminuria, in discussing the question of climate, alludes to the matter in a similar way. My experience accords with that of most physicians in this country, that albuminuria as a sequela of scarlatina is extremely rare.

Dyspepsia, especially due to want of natural tone, or to overwork, or nervous exhaustion from whatever cause, is generally speedily cured. Of course care in diet and in some cases medication is needed to accomplish this object satisfactorily. But it is a very noticeable fact that there are many residents of Colorado now in good health, who came to rid themselves of dyspeptic troubles.

SECTION IV.—DISEASES OF THE CIRCULATORY ORGANS.

Heart Disease, where the valves are permanently injured or there is fatty degeneration, or much dilatation, is altogether unsuited to the climate, as is also the case when atheroma of the vessels exists. In cases in which the climate would be otherwise suitable, irregular and feeble action of the heart even with some dilatation, need not necessarily prevent a patient coming, for with care the cardiac muscle will improve in tone with the rest of the muscles of the body. Where the heart's irregularity is due to nervous causes, the question must be decided on the principles laid down in speaking of nervous troubles generally. It must not be forgotten that this climate, putting more work upon the heart, is in all affections of this organ powerful for good or evil.

Aneurism, as far as I have been able to learn, is relieved. Dr. G. J. Bull, of this city, has at the present time three cases under his observation, in all of whom there is improvement

of the symptoms. They are all actively employed and able to do more work than when at a lower level.

SECTION V.—DISEASES OF THE RESPIRATORY ORGANS.

The throat when affected with chronic catarrh is usually much benefited, probably locally, as indicated by Dr. Weber, by the readier separation of the mucus. I have also had cases of tuberculous ulceration of the larynx, in which the ulcers have healed under topical and general treatment, though Dr. Weber states such cases are not suitable.

Chronic Bronchitis is also improved, though the cough at first is frequently increased for a time. When, as a result or complication of the bronchitis, there is much emphysema, considerable risk is run by coming to this elevation. However, when the emphysema is moderate in extent, and exertion is avoided for the first few weeks, the readier clearing of the bronchial tubes allows the sound portions of the lungs to be more perfectly used; the strain upon the emphysematous parts being thereby relieved, the patient ultimately breathes with greater comfort, and the bronchitis is in time removed. Where old, chronic bronchitis with emphysema exists there is frequently marked dilatation of the right side of the heart, in which case a patient should by all means avoid Colorado.

Acute Bronchitis, as has been mentioned, is liable to arise in this climate.

Chronic Pleurisy and its results, empyema, etc., are decidedly benefited, for, as might be expected, the tendency of the climate is to cause the absorption of pus and unorganized lymph. Further, when the adhesions are so far organized that the lymph cannot be sufficiently absorbed to allow the return of free motion to the lung, the improvement in the exercise of its other portions counteracts, in a great measure, the disadvantages caused by the permanent adhesions.

Acute Pleurisy, on the other hand, frequently occurs here to imprudent persons.

Chronic Pneumonia the climate tends to remove.

Acute Pneumonia, as has been stated, quite often occurs here, and is severe in its attack, though the convalescence is generally speedy.

SECTION VI.—PHTHISIS.

What Dr. Weber has written upon this disease in connection with elevated resorts, is fully endorsed by clinical experience in Colorado Springs and Manitou, and I believe, speaking broadly, that these two places present more favorable conditions for the climatic relief of consumption than any other places at present available to invalids. The question of the probable advantage accruing to consumptives from resort to this region cannot be determined by the nature of the disease alone, but in connection with the collateral conditions.

General constitutional conditions necessary for successful treatment in high altitudes have been dwelt upon on page 81, viz: That a certain integrity and resisting power of the constitution is demanded, as well as certain conditions of the circulation, nervous system and temperament, which will be referred to later.

General Topical Conditions.—These must be such as to ensure, in the first place, sufficient margin of healthy lung tissue to bear the increased work that the rarified air throws upon the respiratory act, and this should not be determined merely by the extent of the damaged tissue, but also by the quality of the breathing carried on by the sound portions. For instance, cases in which both lungs are affected, or where there are large cavities, will often derive benefit, if the remainder of the lung tissue acts with freedom and vigor. Great care must also be exercised on first arriving, and here comes in the very important point of the condition of the heart.

Circulation.—The heart ought to be examined and its history enquired into in all cases of phthisis seeking change to elevations. This especially applies to persons in whom the amount of sound lung is limited, for the demand for faster and stronger pumping by the heart is greatest upon them, and where there is much deficiency in muscular power, imperfection of the valves, or dilatation of the cavities, there is great risk of the heart's action continuing to increase in rapidity and lose in force till it comes to a standstill, instead of, as when it has sufficient integrity, gradually losing the frequency which the elevation at first induces and gaining force, so that at the end of a few weeks, more or less, the heart beats are at the usual rate, but more than usual strength.

Nervous System.—The heart, in connection with phthisis, has been thus far considered in its directly mechanical relationship, viewed merely as a pump. Over and above this is the relationship that it occupies by reason of its subjection to the general nervous system, through its own special nerves. It is through this channel that the temperament of the individual exerts its particular influence upon the progress of phthisis.

Temperament and fever.—As depicted by Dr. Weber in his remarks on page 84, there is undoubtedly a temperament which is termed *erethic* in which naturally there is an abnormal susceptibility of the vasculo motor system, or nervous system controlling the heart and circulation, to slight exciting or irritating causes, and as dry air and elevation are both powerful stimulants to nervous action, this system is in danger of being over excited and the fever increased; whereas in the *torpid* temperament, in which there is naturally an unusual dullness of nervous susceptibility and therefore a sluggishness of the circulation and heart's action, the stimulus that such a climate as this affords acts beneficially in quickening the circulation, thus helping the absorption of morbid products and improving the nourishment of the affected parts. In these

two temperaments what may be termed the mental nervous system is usually in accord with the sympathetic, which is the system that we have just discussed. Will and circumstance, however, largely control mental manifestations, so we cannot trust to them as our only guides without inquiring further, for many persons are nervous, not from temperament, but from weakness of will power, physical depression, or education, and on the other hand, persons with genuinely excitable nerves may exercise control enough to mask their natural temperament. This it is that makes it so hard for the lay public to reconcile the two statements that are commonly made that Colorado is good and bad for nervous people; to sum up broadly, it is good for a nervous system needing a stimulus, and bad for one that does not. What has been quoted from Weber, Brandis and others about a dry, rarified, antiseptic air being the best direct application to a wounded surface, whether on the skin or in the lungs, is amply verified by clinical experience in Colorado. But as the nervous and arterial systems exert so powerful an influence upon the local conditions they must be considered in the manner as stated above.

Hemorrhages.—It is, beyond question, true that the direct mechanical effect of the climate is to lessen their frequency, and when the temperament is suitable the general constitutional effect greatly assists. The old delusion that elevation per se increased hemorrhages has been so far dispelled that we need not here dwell further upon it. Dr. Charles Denison, of Denver, in his able work upon Rocky Mountain Health Resorts, published by Houghton & Osgood of Boston, and Dr. J. Reed, of this city, in a valuable paper published in the Colorado Medical Society's transactions for 1878, corroborate the evidence given by Dr. Weber, as quoted upon page 85.

Advanced Cases.—Where the disease is much advanced it goes without saying that no honest physician would recom-

mend a change of climate, and especially so great a change as to an elevation of several thousand feet; but cases do often come of their own will, cheered by the delusive hope that is characteristic of the disease, and though the result is usually a hastening of the end, yet death is generally less tedious and harrassing, the sick one frequently being out enjoying the sunshine up to the last day, dying quietly and quickly with a failing heart, instead of being confined to bed for days or weeks in a close, heavy atmosphere, which impedes the last struggling efforts at respiration.

Influence of General Surroundings.—Over and above the local and constitutional aspects of the disease, stands the individual himself, and his relation to outside circumstances, as largely influencing the question of change of climate in cases of phthisis, more particularly than in any other disease. Where the constitution is markedly impressed or the local mischief extensive, questions of food, lodging, exercise and mental occupation are of the utmost importance. It is therefore of little use to send a consumptive to a climate where nourishing, well-cooked food in sufficient variety cannot be obtained, or where the houses are poor, unhealthy or ill-furnished. In this locality both these requirements are amply met, hotels, boarding-houses and villas of suitable character being found, and the numerous market gardens, lately started, afford abundance of vegetables and fruit, with plenty of farm produce of the best quality. In the questions of exercise and mental occupations, what has been said in the introduction about the inadvisability of invalids seriously affected being sent for change of climate unattended, is pertinent; there is no greater danger from obliviousness of the physician's advice, than in the matter of exercise in elevated regions. With respect to mental occupations and interests, the bugbear of homesickness is often of much importance, it is therefore of

considerable moment, not only that the patient should if possible make his trip with a congenial companion, but that his surroundings at the resort should be cheerful and interesting, and this latter is a great point in favor of Colorado Springs, because out-door life being continuously more possible and enjoyable than perhaps in any other region open to health-seekers, there is not that gloomy huddling of coughing invalids around a stove that usually marks the consumptives' retreat; further, there is the very evident fact that a large part of the active workers in the community are restored consumptives, and therefore living encouragements to the pilgrim on the road to health. One of the worst and commonest features of a health resort viewed from its mental aspect, is absent from Colorado Springs, the lack of any interest but amusements and no other society but that of other sick boarders, and consequently conversation mainly bounded by comparison of coughs as is found in those resorts which consist of one or two large hotels and boarding houses. Here the invalids are mostly scattered about in small boarding houses, private rooms or families, well sandwiched with healthy persons, so that the mental contagion of the disease is avoided. In the treatment of insanity the crowding of patients in large establishments is injurious and the scattering of them through a village as at Gheel in Belgium beneficial, so is it the case with the poitrinaires in their special cure places. Even when they can themselves take no part in the useful occupations of the community, they usually enjoy some interest in them, and to those who have means the opportunities for safe investment of capital at high rates of interest, that the growing industry of a newly developed country offers, assist to take their minds off the constant introspection so common to many invalids. Those who recover sufficiently to engage in business and who, thinking prudence the better part of valor, forbear to return as residents to the climate and occupations in which their

malady developed, can generally find at some point in this elevated region, healthful and remunerative employment.

Length of Stay.—It is commonly said that if a person comes to Colorado he can live nowhere else afterwards. This is a mistake, as shown by Dr. Weber on page 88, in speaking of elevated resorts in general. If a person is cured both in his lungs and constitution, the increased chest expansion that the climate has induced will make him better able to cope with the disadvantages of his home climate, and the dry cold of Colorado will cause him to be less susceptible to cold-catching than before. When the disease though not removed is stationary, certain patients may pass with advantage some months of the year in Colorado and the rest elsewhere, as the visitors to the European mountains do, and this changing climate under certain circumstances is often most advisable. However, the truth of the whole matter lies in the fact that phthisis is always more or less a constitutional disease, and that though the particular inflammation or catarrh which caused the local signs may disappear, there will remain for years, and perhaps for life, the constitutional tendency for any fresh inflammation or catarrh to take on the morbid character of consumption. In most persons, therefore, in whom have been developed, even slightly, one of the forms of lung disease that is classed under the head of phthisis, one, two or more years of favorable surroundings are necessary to outgrow the evil tendency, but with some the constitution and the lungs are so impressed with the malady, that life is only obtained by continuous dwelling in a climate which, like Colorado, is inimical to their disease. The advantages that such a resort as Colorado Springs presents for the relief of this fell malady are very great, notably in the fact that out of the whole three hundred and sixty-five days in the year, the days that are positively unfavorable are few and far between, and there are no months or seasons that have to be shunned as in most cure

places. Patients can come at any time, can remain with advantage throughout the year, and in the majority of cases it is the *chronic* effects of the climate that overcome the *chronic* effects of the disease.

Change of Locality.—Many pass the summer and fall in town and sleep in a tent in the garden, or camp in the foothills around, with advantage; others who are slightly affected or in whom a year's residence has procured a recession of their symptoms, can spend a month or two at this season camping in the mountains with pleasurable profit. But during the remainder of the year, especially in the winter time, there is no place certainly in Colorado or New Mexico where the majority of the invalids can combine more comfort and advantage than in Colorado Springs.

CHAPTER X.

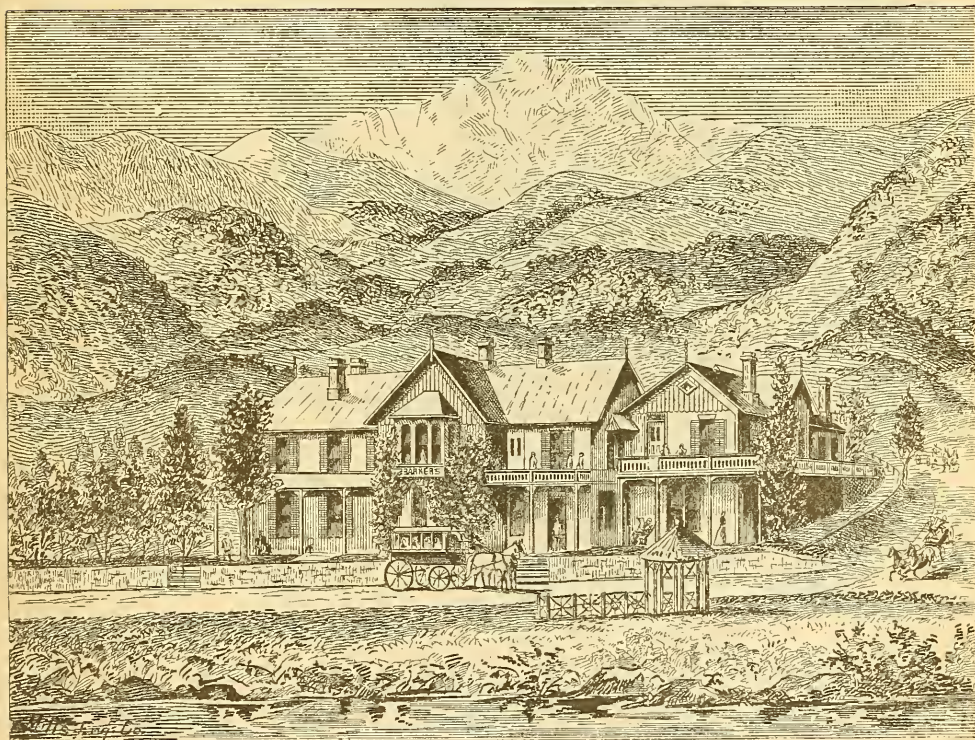
MANITOU.

The statements, concerning the climate of Colorado Springs apply to Manitou, with important modifications owing to its being in a valley instead of on a plateau. The general modifying influences of valleys, as stated upon page 76, are confirmed by our local experience. The summer is somewhat cooler and damper, while the winter is slightly less dry and warmer, being more sheltered, the only wind blowing with direct force being the west, which though it comes from the mountains is usually warm. The hours of daylight are shorter.

The Springs all contain a moderate quantity of carbonate of soda and minor ingredients, and some also iron and Glauber's salts. They are cold, and charged to saturation with carbonic acid, which increases the activity of their properties and makes them extremely palatable. They are peculiarly adapted for drinking and bathing in cases of anæmia and in most chronic stomach, liver, and kidney affections occurring in debilitated persons with whom the climate agrees. A detailed account of these waters will be found in my pamphlet on Manitou, published by the Gazette Publishing Company, Colorado Springs.

BARKER HOTEL.

C. W. BARKER, Proprietor.



MANITOU SPRINGS, COLORADO.

MANITOU HOUSE

MANITOU HOUSE

COLORADO.

A. W. BALLEE.

— PROPRIETOR —

Collier & Cleveland, 414 N. Denver, Colo.



